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POSITION OF HUBBARD GLACIER FRONT IN 1792
AND 1794.*

BY

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From the accounts presented in the reports of the Malaspina and Vancouver expeditions, the late Professor I. C. Russell drew the conclusion that in 1792 and 1794 the front of the Hubbard Glacier was approximately five miles farther down Disenchantment Bay than it is at the present time, reaching Haenke Island.† This interpretation of the descriptions in these reports has been quite generally admitted. It is, for example, accepted by Dr. G. K. Gilbert in his description of the glaciers of Yakutat Bay.‡

Our work of two seasons in the Yakutat Bay Inlet has led us to question this interpretation of the descriptions of these two early explorers. In this field work we have discovered three lines of opposing evidence; though it cannot be claimed that, by themselves, these are absolutely fatal to the interpretation.

The first objection is in the character of the vegetation. So far as we could see, there is no difference in the maturity of plant development in Disenchantment Bay north and south of Haenke Island. This is quite in contrast to the condition in Nunatak Fiord and a large part of Russell Fiord, which the Nunatak Glacier, with tributaries, has occupied quite recently and probably within the last century. Here the vegetation is so immature as to prove conclusively the recency of ice occupation. There is no such evidence in Disenchantment Bay, although the conditions for plant growth are no more favourable there than in Russell Fiord.

* For a map showing the location of places referred to in this paper, see this BULLETIN, Vol. XXXVIII, 1906, opposite p. 145.

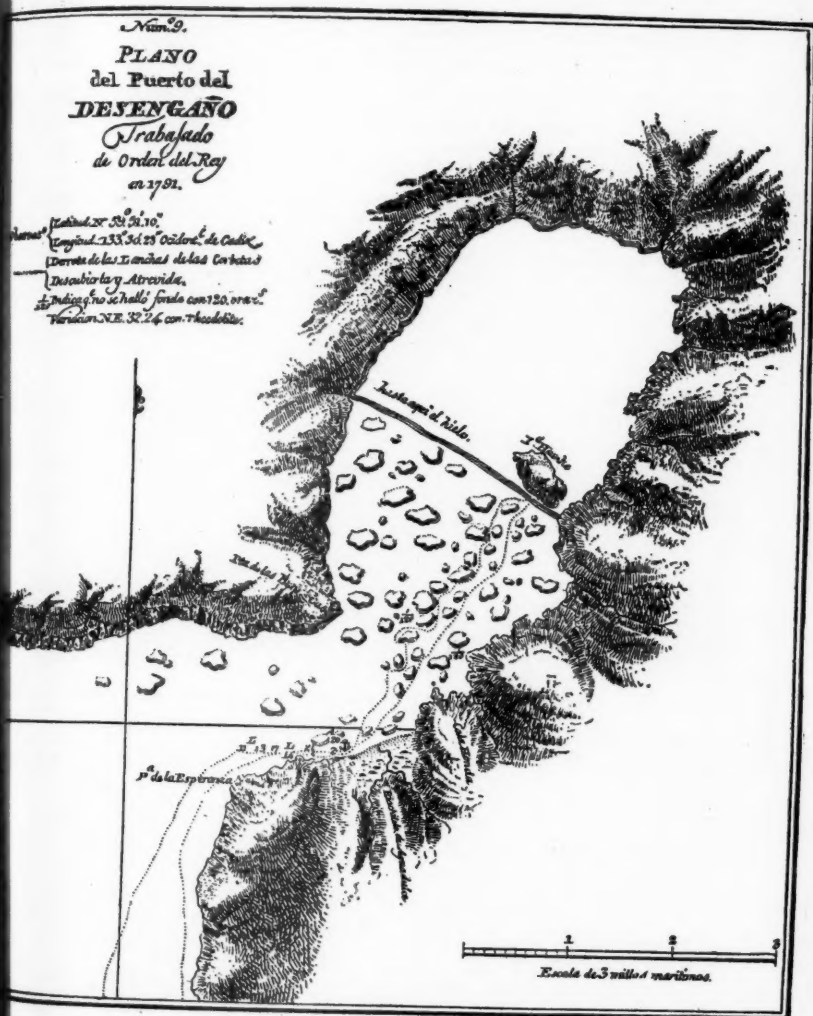
† Nat. Geo. Mag., Vol. III, 1891, pp. 62-68.

‡ Harriman Alaska Expedition, Vol. III, Glaciers and Glaciation, 1904, pp. 48-49.

A second objection to the belief in such a recent extension of Hubbard Glacier down as far as Haenke Island is the absence of lacustrine deposits in that part of Russell Fiord between Osier Island and Cape Enchantment. When the Hubbard Glacier extended down to Haenke Island, it must, at least in its retreating stages, have dammed up this part of Russell Fiord, forming a lake, the shore-lines and clay deposits of which ought to be easily recognized if they were formed no more than a century ago. Such shore-lines are clearly recognizable at the southern end of Russell Fiord, where they were formed in the lake which was ponded back by the ice dam of the expanded Nunatak Glacier; but they were not discovered in lower Russell Fiord, where they would be expected if the Hubbard Glacier had so recently extended down Disenchantment Bay. If ice from the Nunatak Glacier is supposed to have then filled this part of Russell Fiord, thus preventing lacustrine deposits, that fact should be indicated by the vegetation; but this is not the case, for the vegetation in this part of the fiord is as mature as that in Disenchantment Bay.

A third objection is furnished by the shore-lines in Disenchantment Bay. These have been recently raised above sea-level during the uplift accompanying the earthquakes of 1899, and are therefore very clearly exposed to view. They are strongly developed all around Haenke Island and on the mainland from there to Osier Island. They are altogether too strongly developed for wave work of a single century; and, moreover, those toward the south have no appearance of greater maturity of development than those toward the north, as young shore-lines should, with progressive ice retreat. In the six years since the uplift, even the competent iceberg waves have made no notable cuts in the bed rock at the new stand of the land, not even having erased delicate glacial striæ along much of the new coast-line. It seems hardly credible, therefore, even with much more competent iceberg waves, that in less than nineteen times six years (1794 to 1899) rock benches two or three hundred feet wide should be planed back by the waves, as must have been the case if we accept the current belief that the Hubbard Glacier occupied the site of these benches a little over a century ago.

These considerations have led us to examine critically the Malaspina and Vancouver accounts, and the result has forced us to question the evidence even more strongly. It is certainly not a necessary conclusion from the descriptions; and for the reasons stated below it seems hardly a probable one.



MAP OF DISENCHANTMENT BAY, AFTER MALASPINA.

FIG. I.—REDUCED FROM RUSSELL'S REPORT.

*Malasпина's account is as follows:**

An observatory was established on shore, and some absolute altitudes were taken in order to furnish a basis for the reckoning of the watches; but the great concourse of Indians, their importunity and thievishness, made it necessary to transfer all the instruments on board. Still the latitude was determined, the watches were regulated, the number of oscillations made by the simple pendulum was observed, and the height of Mount St. Elias was measured, being 6,507.6 varas (17,847 feet) above sea-level. The launches being ready, put to sea on July 2 with the commander of the expedition, in order to reconnoitre the channel promised by the opening, similar to that depicted by Ferrer Maldonado in his voyage; but the small force of the tide noticed at the entrance, and the indications of the natives, made it plain not only that the desired passage did not exist there, but that the extent of the channel was very short; which was also rendered evident by the perpetual frost covering the inner west shore. The launches anchored there, having penetrated into the channel with great difficulty, the oars being clogged by the floating masses of snow; they measured a base, made some marks, gathered various objects and stones for the naturalists, and, having reached the line of perpetual frost, returned to the bay where they had anchored. (†) They there observed the latitude to be $59^{\circ} 59' 30''$, and six azimuths of the sun, which gave the variation of the needle as $32^{\circ} 49'$. Before leaving that anchorage the commander buried a bottle with record of the reconnaissance and possession taken in the name of the king. They called the harbor Desengaño, the opening Bahía de las Bancas, and the island in the interior Haenke, in memory of D. Tadeo Haenke, botanist and naturalist of the expedition. On the third day they set out on their voyage to Mulgrave, where they arrived on the 6th, after reconnoitring various channels and islands north of that port and mapping them.

In this account it is stated that there was "perpetual frost covering the inner west shore;" that the oars were "clogged by the floating masses of snow;" and that, "having reached the line of perpetual frost," they returned. It seems scarcely probable that any explorers would have been hardy enough to really "reach the line of perpetual frost," if by that it was meant that they had reached the 250-foot cliff of a tidal glacier, from which icebergs were being constantly discharged. Had they done so it does not seem conceivable that they would have been content with this tame description of so remarkable an experience; especially in view of the fact that elsewhere they have reported the most trivial experiences and observations. To have seen a solid wall of ice three miles long and two hundred and fifty feet high, from which icebergs were being constantly discharged, the air filled with sounds like thunder, and the waters of the fiord disturbed by huge iceberg waves, would have been an experience which one would normally expect recorded by at least a word or two, if not by vivid description, especially by men from southern Europe, where tidal glaciers are unknown.

The map accompanying the Malasпина report bears the words "hasta aqui el hielo," meaning "ice up to here." The ice region is bounded by three parallel lines, not hachured to indicate a cliff, as has been done in other parts of the map where abrupt cliffs are present. There is no special indication of a change of conditions be-

* Quoted from Russell's paper, *Nat. Geog. Mag.*, Vol. III, 1891, pp. 64-65, where Malasпина's account is translated by Robert Stein. For the original see "Relacion del viage hecho por las goletas Sutil y Mexicana en el año de 1792, etc. (Por Don Dionisio Alcalá Galiano.) Madrid, 1802, with Atlas. Pp. CXII-CXXI.

† On the coast of the mainland east of Knight Island.—I. C. R.

tween the water of outer Disenchantment Bay and the ice-covered part of the inner bay; and the eastern shore-line is drawn as if there were no break in conditions on the two sides of the "ice up to here" line. The symbol of these lines, which it is noteworthy is the same as that used to indicate individual icebergs, is extended up the west shore, and on to the land as a river, as if the chronicler thought the ice was derived from the land. The eastern shore-line, on the other hand, is drawn in with much detail, exactly as is the shore-line farther down the bay below the ice limit. If a great glacier then existed here, the map maker must stand convicted of gross untruthfulness,



FIG. 2.

for he could scarcely have failed to see the striking difference between a water contact and an ice contact with the land. That he so clearly draws a water contact is fair indication that this is what he really saw there.

It is noteworthy that the ice line is drawn as extending entirely outside of Haenke Island. Had the glacier front actually been down this far at that time, the ice must have ridden around, and at least partly over Haenke Island. Moreover, to have completely united the two tongues on the southern side of the island would have necessitated a much greater advance of the glacier in the deeper inlet, on the west side of Haenke Island, than the map indicates. That it was not glacier ice that they encountered immediately south of Haenke Island is practically proved by their statement that "they measured a base, made some marks, and gathered various

objects and stones for the naturalists." Their map shows the route, and it is evident that it was Haenke Island on which this was done. Had a glacier completely wrapped around this island they could not have landed there.

These considerations lead to the question whether these explorers, in speaking of "perpetual frost," meant anything more than a fairly compact mass of floating ice. Even at the present day the entire fiord at Haenke Island is frequently obstructed from side to side with a massive accumulation of floating ice, through which it is exceedingly difficult and even dangerous to force a small boat; and the "inner west shore" is almost all the time enclosed in a floating mass of ice, which might well be called "perpetual frost."

In the second expedition to Yakutat Bay, in 1906, the captain of the steamer *Santa Ana* had instructions to land the senior author and his party on the west side of the inlet near the entrance to Disenchantment Bay. Although accustomed to navigating the ice-laden waters of Icy Straits, and other Alaskan inlets in which there is floating ice, the captain refused point blank to run the risk of pushing even his small boats through the half mile of ice which hugged the "inner west shore" of the Bay. Moreover, he went so far as to say that one could not push a boat through this ice. We proved this not to be the case on the next day when we ourselves moved to the west shore through the packed ice. But it took several hours to make the passage of a little over half a mile, for the ice was packed together so closely that it was necessary first to push the bergs away and then to pole the boat through the opening, which closed again as soon as the boat had passed. At that time of year, the last week in June, which was only a week earlier than the season of Malaspina's visit (July 2nd), the smaller pieces of floating ice were frozen together in great cakes, which it was necessary to first break apart before we could move forward.

Frederick Funston, now Brigadier General of the United States Army, writing of his experiences in 1892 says:* "Canoeing in Disenchantment Bay was attended with much labor and no little peril, as we were constantly in danger of being crushed in the floating ice which filled the bay at nearly all times." This is the impression produced upon most observers, especially if it is their first experience with massive accumulations of glacier ice.

It seems not at all improbable, therefore, that if Malaspina's crew, from southern Europe, had encountered no worse ice condition than is common at the present time, especially in the early

* Contributions U. S. National Herbarium, Vol. III, No. 6, 1895, p. 327.

part of the summer season, they would have decided that further progress was impracticable, and would have turned back, with the report that there was "ice up to here."

The description in Vancouver's report* of the conditions discovered by Peter Puget in 1794 is no more convincing than the Malaspina account. This report states that boats sent up to explore the inlet found it

closed from side to side by a firm and compact body of ice, beyond which at the back of the ice a small inlet appeared to extend N. 55 E. about a league.



FIG. 3.

(FIGS. 2 AND 3).—VIEWS IN THE FIELD OF FLOATING GLACIER ICE IN DISENCHANTMENT BAY BELOW HAENKE ISLAND. IN FIG. 3 THE TURNER GLACIER IS SEEN IN THE BACKGROUND ON THE LEFT, THE HUBBARD GLACIER ON THE RIGHT.

As in the case of the Malaspina description, it seems strange that there should be no mention of the remarkable features connected with a glacier front, if such an ice cliff then stretched across Disenchantment Bay at Haenke Island. The most trivial circumstances are mentioned in these volumes, and yet so striking a phenomenon as an ice cliff, with all the accompanying features of grandeur, was dismissed in the words "firm and compact body of ice."

A still greater difficulty in the way of accepting the conclusion

* *A Voyage of Discovery to the North Pacific Ocean, and Round the World, 1790-1795.* New edition, 6 vols., London, 1801, Vol. 5, p. 389.

that the glacier then extended this far, lies in the mention of "a small inlet" "back of the ice," and some three miles or more in length. It would be very difficult to account for an inlet in such a position if this ice was really meant for the extended Hubbard and Turner glaciers. But if by "firm and compact body of ice" he means floating ice, or frozen ice cakes (Puget's visit was also in the first week of July), the inlet is easily understood, for at present it very commonly happens that, while much of the bay is shut in by ice, there is a narrow lane of relatively clear water between Haenke Island and the mainland, and from there northeastward toward Osier Island.

Later in the Vancouver report* there is a sentence which leads us to believe that our interpretation of his meaning in the use of the words "firm and compact body of ice" is correct. Describing the experiences of Mr. Whidbey in Cross Sound, near Dundas Bay, he says:

This made Mr. Whidbey apprehensive that the still apparent connected body of ice from side to side would at length oblige him to abandon his researches by this route, unless he should find it possible to force a passage through this formidable obstruction.

If he had this fear in the relatively small accumulations of ice in Cross Sound, Puget might well have had enough more fear in the massive ice fields of Yakutat Bay to report the ice as "firm and compact," and to "abandon his researches."

That the Hubbard Glacier has recently been much further down the fiord than at present, and that this advance brought it down beyond Haenke Island, there is no question. All facts in the field indicate this, and, in addition, that up to the present time the glaciers have been in a state of recession for a long period. Doubtless a century ago both the Turner and Hubbard Glaciers were further out in the fiord than at present; and if that were the case, it is probable that there was then even more floating ice in the bay than now. But that in 1792 and 1794 the ice front was actually down to the south side of Haenke Island seems to us not to be demonstrated by the evidence presented in the reports of the Vancouver and Malaspina expeditions.

It is a disappointment to lose this case of what at first seemed to be an authentic instance of marked historic glacial retreat, but the evidence, as we interpret it, forces us to believe that this is necessary.

LOP-NOR—A CHINESE LAKE.*

BY

ELLSWORTH HUNTINGTON

PART II.—THE HISTORIC LAKE (LOP-NOR).

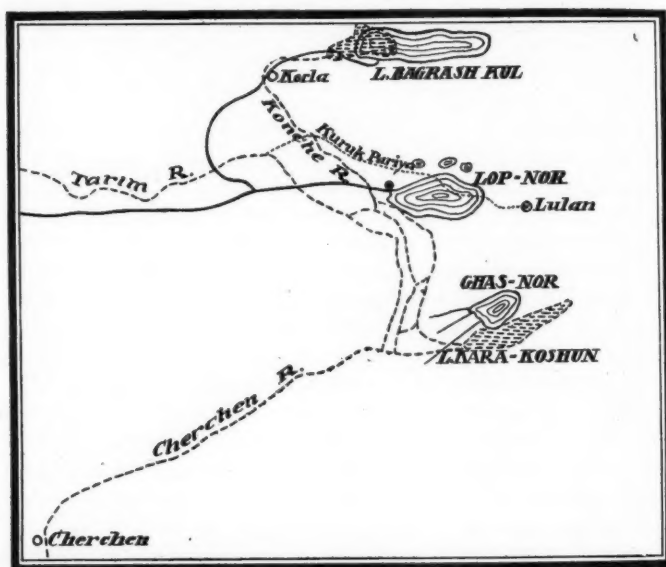
After the recovery of the camels, I completed my work in the unexplored portion of the Lop desert by travelling southwest to the ruins of Lulan, which I have discussed elsewhere, and then west to the Tarim River. Having thus been the first explorer to complete the circuit of Lop-Nor, I was in a position to estimate fairly the merits of the controversy which has arisen as to the identity of the reedy modern lake of Kara-Koshun with the Lop-Nor of the ancient Chinese. Przhevalski, the Russian discoverer of Kara-Koshun, believed that it was the shrunken representative of an expanded Lop-Nor of ancient times, but he does not carry the matter to any definite conclusion. Hedin, to whom we owe most of our knowledge of the region, believes that any great permanent change in the size of the lake during historic times is impossible, and that, though Kara-Koshun and Lop-Nor were both fed by the Tarim River, they were never parts of a single lake. My own view includes certain elements of both the preceding views. Kara-Koshun seems to be the small modern remnant of a large ancient Lop-Nor; but in the period from about the third to the eighth centuries of our era Lop-Nor seems to have contracted to small size and to have occupied the position assigned to it on old Chinese maps, about a degree north of Kara-Koshun.

In travelling around Lop-Nor, I discovered that the old lake-bed is surrounded by terraces and by ancient aqueous deposits. The latter consist of greenish, lacustrine layers of fine clay of uniform texture, alternating with reddish, non-lacustrine layers of coarser material full of lenticular beds of sand and fine gravel, which must have been deposited subaërially at a time when the lake had contracted in size. These alternating deposits, like similar ones at Turfan, one or two hundred miles to the north, and at Seyistan (Sistan), far away in Persia, indicate that previous to the series of epochs of *decreasingly* severe climatic fluctuations known as the Glacial period, there was a series of epochs of *increasingly* severe

* Continued from February BULLETIN, p. 77.

fluctuations of which the record has not yet been investigated. This indicates that in the most recent geological times climate has been much more variable than is generally supposed.

The record of the *decreasingly* severe series of changes is preserved in six lacustrine strands, lying at heights of approximately 600, 300, 115, 35, and 12 feet above the present level of Kara-Koshun. The figures are approximate: the lowest strand is at least two or three miles from the lake and often ten or twenty, and I had no means of levelling. The two oldest strands lie far from the lake and are much covered with talus, but can be clearly distinguished



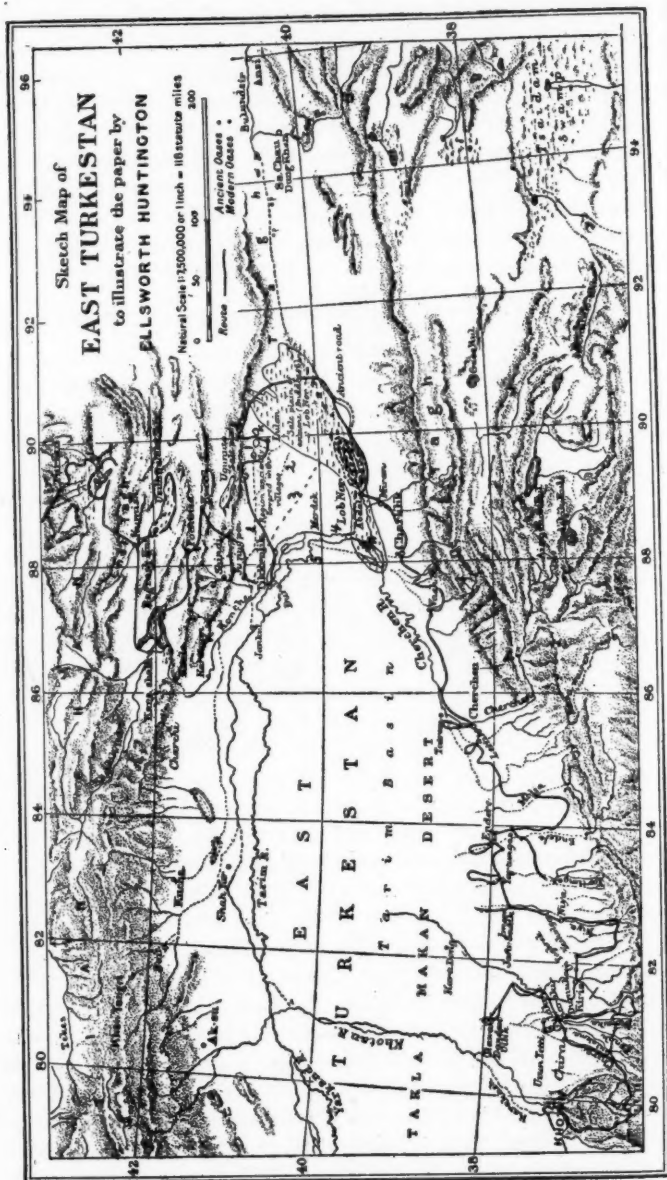
MODERN EDITION OF AN ANCIENT CHINESE MAP, AFTER WAGNER AND HIMLY'S WU-CHANG-FU MAP.
THE DOTTED LINES SHOW MODERN LOCATIONS OF LAKES AND RIVERS.

where they lie at the foot of huge bluffs cut in the front of fans, as at Jiluck, between Vash Sheri and Charklik. The youngest strand is very faint and very recent. In number, relative size, and relative age the strands agree with the terraces which occur in most of the valleys of Central Asia, and with the old moraines high up in the mountains. The close agreement of these three sets of phenomena makes it highly probable that they are all due to a single series of climatic changes. If, then, as we shall see some reason for believing, the lowest strand of Lop-Nor was formed during historic times, we

must conclude that the last faint pulsations of the Glacial period have as yet scarcely died away.

Modern Lop-Nor, or Kara-Koshun, like all lakes of its class occupying part of the sediment-covered floor of an enclosed basin, is very shallow and lies in an extremely flat plain. Consequently it has changed its position during historic times. When Przhevalski discovered Kara-Koshun it proved to lie a degree farther south than the Lop-Nor depicted on old Chinese maps such as that which is reproduced in part in the heavy lines on the opposite page. The Chinese were able to determine latitude with a high degree of precision, but in their determination of longitude they were liable to large errors. In the map before us Lop-Nor should lie a degree farther east; the solid black dot which I have inserted at the west end of the lake ought to coincide with Lulan. Combining all the data procured by Hedin and myself with those derived from the Chinese maps, it appears that in ancient times, as shown in the sketch map of East Turkestan on page 140, the Tarim River flowed along the now dry bed of the Kuruk Dariya marked (1) on the map, and divided into two arms, one emptying into some little lakes of which I discovered the dry beds, the other into the main lake of Lop-Nor, south of Lulan. A little later only the latter channel was used. Then the river shifted into one or both of two dry channels which I discovered farther west. They are bordered by a dry poplar forest, which does not appear to have been dead so long as that beside the Lulan channel; the natural inference is that the one farther west is younger. Finally, the stream swung still farther to the right and assumed in the main its present course, although in the lowest fifty miles it has kept on changing its bed in even later times, as may be seen from the map where the successive courses are numbered. At present the river flows nearly south from Tikkenlik to the almost dry lake of Kara-Buran at the mouth of the Cherchen River and then east to Kara-Koshun. Apparently one or the other of these is the modern representative of the Ghas-Nor of the old Chinese map, although Hedin and one or two Russian authors have doubted it.

Various causes appear to have contributed to the migration of the Tarim River and its terminal lake. In regard to the latter, Hedin has proved by an exact survey that the region between Lulan and the southern shore of the Kara-Koshun lake—that is, the old bed of Lop-Nor—consists of two shallow basins. Farther east I found that the same is true, as is evident from the greater salinity and dampness of the hollows, and from the fact that, although the horizon appeared perfectly flat, a broad view opened both to north and south



when we insensibly ascended to the top of the central swell. We saw the whole of mountains whose tops alone had previously been visible. The Lop-Nor of the Chinese maps occupied the northern hollow; the modern Lop-Nor occupies the southern. Silt brought in by the river, sand deposited by the wind, carbon from reeds, and the remains of animal life must rapidly fill the shallow hollow where water stands and raise it above the level of its dry neighbour, whose bottom is subject to constant deepening by the wind. Hence the lake must change its position. Hedin assumed that the change must have a pendulum-like regularity, and that the river must follow the lake. In 1900 and 1901 he seemed to find the beginning of a swing back to the north, for one of the old river-channels, number 4 on the map, had been reoccupied by water, and a considerable area to the north of Kara-Koshun was being rapidly flooded and converted into new lakes and gulfs. Five years later, however, I found that the whole region had returned to the old condition of aridity. The level of the main river and of all its marginal lakes had fallen four or five feet, and that of the terminal lakes of Kara-Koshun had also fallen. Hedin's visit coincided with a time of exceptionally high water; mine with a more normal period.

Changes in the course of the Tarim River probably have more influence on the position of the lake than *vice versa*. Hedin attributed the migration of the river to two chief causes—namely, a supposed tendency of rivers to cut to the right in the northern hemisphere because of the earth's rotation, and the effect of the prevailing northeast gales in driving the water in erosive waves to the right bank of the river and in filling up the left side with wind-blown dust. Recent investigations of the Mississippi have thrown grave doubt on the theory of a right-handed deflection of rivers by the earth's rotation. The wind, however, is probably an effective factor. Another important cause of the peculiar changes in the course of the Tarim River may perhaps be found in the influence of the zone of vegetation. During the driest of the Inter-Glacial—or, as they may here better be called, Inter-Fluvial—epochs, the river, apparently, decreased in size so that it was not only unable to form a lake, but withered to nothing far up-stream. During the succeeding Fluvial epoch of lower temperature, or of greater precipitation, or both, the river must have regained its length. In doing this it would be easy for it to flow eastward along the zone of vegetation which everywhere lies at the lower edge of the zone of piedmont gravel and parallel to the base of the mountains; but it would be difficult to break southward through the rampart of sand which always accumu-

lates on the border of an area of vegetation. Thus the river appears to have acquired an unstable position, flowing across instead of down the main slope. Whenever it accidentally broke through the retaining wall of sand it swung to the right. Thus it is gradually setting back to a normal course in the lowest part of the basin. If to this tendency of the river to change its course we add the influence of a changing climate with a period of especial aridity culminating between the fourth and eighth centuries of our era, all the known facts in regard to Lop-Nor and the Tarim River find adequate explanation. The problem is extremely complex, however, and the theory here advanced finds its strongest proof in regions outside Lop-Nor.

The earliest-known fact as to Lop-Nor is that the ancient Chinese called it *the* "Great Salt Lake." No one would think of doing so to-day, for the greatest expanse of open water is only five or ten miles. The old Chinese also called it a "Marsh," and the "Lake of Reeds," but these names probably arose at a later date than that of the "Great Salt Lake," at a time when the expanse of water was less. As to the actual size of the lake, the old records are diverse. The history of the first Han dynasty, written about the time of Christ, gives the size of the lake as seventy-five miles each way. At this time Lulan must have consumed much water, which would naturally diminish the area of the lake. A later record of unknown date, but probably belonging to the centuries of great aridity, says fifty miles by twenty-five; and another, one hundred miles in circumference, which is still smaller. Whether these figures refer to the entire marsh or only to the area of open water is uncertain. Hedin gives the size of the modern Kara-Koshun as seventy-five miles by eighteen, including all the marshy tract, which, he says, comprises nine-tenths of the entire area. Przhevalski gives sixty or seventy miles by thirteen; but his map diminishes this. So far as any conclusion is justifiable from such meagre data, it appears that in the very earliest times Lop-Nor was larger than now, in spite of the great drain on the water of the Tarim and its tributaries for the support of the dense population of that day. Somewhat later, at an unknown but early date, the lake seems to have been of much the same size as now.

Hedin, who utterly scouts the idea of any change of climate during historic times, recognizes that during certain periods Lop-Nor has been distinctly larger than it now is, even during times of unusually high water. He explains this on the assumption that during those periods the number of marginal lakes and swamps on the Tarim River was less than now. This is not probable. When a

river has reached the mature stage of the Tarim the average quantity of water diverted to marginal lakes is nearly constant throughout any period of long duration, though it may vary from year to year. A *permanent* change in the size of the lake could not result from this cause. Moreover, a comparison of the conditions in 1900 with those in 1906 shows that, in one case at least, the river, the marginal lakes, and the terminal lake all expanded and later contracted *in unison*.

There is reason to believe that in the Middle Ages Lop-Nor was decidedly larger than now. Rev. G. W. Hunter, of the China Inland Mission, kindly translated for me part of an ancient local Chinese account of Tung Hwang (Sa-Chow) which he had picked up in that city. In this there is an itinerary of the ancient trade route, from Tung Hwang to the Lulan region and westward—a route which was the main artery of trade between China and the West up to the second or third century of our era, but is now utterly unused because of the entire absence of water. At a distance of one hundred and eighty miles (seven hundred and ten li) from Tung Hwang this “very important road,” as it is called, is said to reach the Cho-hu-tong lake, which must be Lop-Nor, as it is connected with the Ta-leng-mu (Tarim) River. This would necessitate the expansion of the lake to a point eighty miles east of Lulan and fully fifty from the present eastern end of the Kara-Koshun marsh; and the water would have to rise nearly or quite to what I have called the twelve-foot strand. The itinerary dates from medieval times; for it does not mention Lulan, which had ceased to exist, having been largely destroyed by 300 A. D. and completely by or before 800 A. D., so far as can be ascertained.

Other facts agree with the itinerary. Grenard speaks of having seen at Keriya a Chinese map dating from the eighteenth century, but probably based on earlier surveys, and showing Lop-Nor in its present position, but very much larger than now. Another suggestion as to the medieval behaviour of the lake is found in the destruction of the so-called Dragon-Town (Lung-shong), lying at some unidentified point southwest of Lop-Nor. The names “marsh” and “lake” are both used in the Chinese work where the history of the town is recorded. According to Himly’s translation, “Lop-Nor streamed over its banks and laid waste the land; the foundations of the city still exist. In the time of Chi-ta (1308-1311 A. D.) the overflowing water, which in the morning reached the west gate and in the evening the east gate, was driven by the wind into the form of a dragon.” Apparently, the level of the lake rose so as to completely overwhelm the city; but it is impossible to determine whether

the rise was permanent, or was temporary like that of 1900. The Lopliks did not come to Lop-Nor till some centuries after the destruction of the Dragon Town. It is a familiar tradition among them that in the days of their ancestors, two or three hundred years ago, the lake and the Tarim River were larger than now. As one of the most intelligent Lopliks said to me, "The water grew less, and that made the fish die. Then our fathers could not get enough to eat, and they began to die or move away."

More trustworthy evidence of the recent greater size of the lake is found in six little strands discovered by Hedin in his survey of the old lake-bed. They are marked by rows of tamarisk bushes, mostly small, accompanied by *limnæa* shells and drifted sand. On the older strands the bushes are for the most part dead, while on the younger many are living. The upper strand lies six feet above the highest recent level of Kara-Koshun, that of 1901, and seven and a half miles from it.

In the history of Karyakoshun, the strands,
says Hedin,

serve as milestones marking successive stages on its way to destruction. The first . . . proves that the northern shore of the lake once extended 12 km. farther to the north than it does now, and implies that its area was then at least twice as great as it is now. On the whole . . . the lake has shrunk at a pretty regular rate.

This may seem inconsistent with Hedin's other statements; but, as already remarked, he attributes the result to an assumed—though, as later observations show, unproved—increase in the number of marginal lakes along the Tarim. On the south side of Kara-Koshun I saw less distinct traces of what seem to be the same strands. The condition of the vegetation shows that they cannot be more than a few hundred years old, and the Loplik tradition and medieval Chinese map are thus confirmed.

Elsewhere, Hedin gives what seems to be evidence that the lake stood still higher not many centuries ago:

This was a stake of tamarisk wood 35 cm. (10 inches) long, half buried in the ground, and undoubtedly placed there at a time when the locality was under water. The lower end of the stake was sharply pointed and burnt. Three of my attendants, who were Lopliks, thought that it had been used to moor canoes to, when their owners had been out on an exploring expedition, and had been unable to reach dry land before nightfall. At the present day the Lopliks in similar circumstances are accustomed to fasten two or more canoes together in some shallow place where, in case of a storm arising, they will not be in too great danger, and so pass the night in them. But it is equally possible that a shore may have run through that spot, and that the stake was situated at its edge. At all events the condition of the ground showed distinctly that it was moist when the stake was put in; for were such a post to be driven forcibly into the hard schor (salt deposit of the old lake-bed), the latter would crack and split. But the post was as fast as if it had been cast in the schor, and it required two or three smart side-blows to loosen it. This piece of wood furnished another proof that this part of the desert was once a lake-bottom, and that the lake was navigated by boats. It would be erroneous to suppose that it was a tent-stake, because the Lopliks, when away from home with their canoes, sleep under the bare sky. . . . As to the question what lake this was, and how far it was connected with the northern or the southern depression—these are matters to which I shall return again later on (a promise for the fulfillment of

which the reader searches in vain). I will here only add that the locality where we found the stake is fully 27 km. (17 miles) from the northern shore of the Kara-koschun (and seven feet above it), and that the ground slopes southwards the whole way from the former to the latter.

Another convincing piece of evidence as to the size of Lop-Nor in ancient times is illustrated in the sketch-map on page 140. On hearing that the road from Charklik to Tung Hwang crossed part of the salt-bed of the old lake, it naturally occurred to me that if the lake ever covered this region during historic times there ought to be an old road skirting the abandoned shore. Accordingly, at Chindelik, I hunted for it, and found two—one keeping everywhere at the base of the bluffs but above the twelve-foot strand, the other keeping always above the bluffs and from a quarter of a mile to a mile from them on the plain of gravel and sand at their top. A distinct track can be traced for miles, while elsewhere the road is marked by cairns of stones. For two days I zig-zagged between the two old roads, and saw them at various points, always bearing the same relation to one another and to the beaches and bluffs. The present road runs almost direct from Chindelik, where there are fairly good springs, to Sachgan Sai, the next source of water, where, however, the springs are very saline: the distance is about twenty-four miles, a long day's journey for loaded oxen, donkeys, and camels, even though the track is level and easy. *Via* the road above the twelve-foot strand the distance between the same points is about thirty-two miles—too much for one day's journey, although the track is almost ideal in texture, and perfectly level. And *via* the road above the bluffs not only is the distance still greater, about thirty-three miles, but the track runs through heavy sand in places and goes up and down more or less in crossing valleys. Along all three roads the country is absolute desert, with neither water, wood, nor forage from Chindelik to Sachgan Sai. It is scarcely probable that the old roads, involving a two-days' waterless journey, would ever have been followed if the shorter modern route, involving only one day's journey, had been practicable.

When I questioned Tokhta Akhun, my accurate and much-travelled Loplik guide, about the old roads, his reply was:

Yes, I know about the road at the foot of the bluffs. When I was a boy there was a little old man, a hundred years old, I think, and all bent up with age. He said that he had heard that when the lake was bigger than now people used to bring fish in canoes to Lachin, where canoes cannot come now. They loaded the fish on donkeys and carried them to Tung Hwang to sell. Here at Chindelik the road made a great bend to the south, which it does not make now. A few years ago (during the recent period of high water, it will be remembered), when I came this way, there was a place halfway from Chindelik to Sachgan where there was bad mud for two or three hundred yards, difficult for donkeys.

"How about the other road, the one on top of the bluffs?" I asked.

"I never heard of it," was the answer, "but I know that one summer a half-witted man of Abdal tried to go across the gravel to Tung Hwang and died of thirst. A Chinese Amban and his servant,

with a camel, came the same way from Tung Hwang one fall. The Amban reached Charklik, but the servant died of thirst on reaching Dunglik. The Chinese know all old things. Perhaps the Amban had read of this road. And I remember that my grandfather said that when he was a boy a man named Osman Bai and his servants tried the same way in summer, but got lost. They scattered everywhere in search of water. One reached Lachin and another Kurgan Sai, but Osman and two or three others died.

Apparently, the present road has only been in use one or two hundred years. Previous to that the lake was so high that the salt plain which the road now traverses was muddy, or perhaps under water. So everyone followed the circuitous dry route along the twelve-foot strand. Still earlier, however, this, too, was impracticable, apparently because the water actually reached the strand, and the road necessarily followed the still longer route over the gravel and sand above the bluffs. We have no means of dating the road exactly, but it was used in medieval times after the abandonment of the Lulan route.

To sum up the history of Lop-Nor during the last two thousand years: We have first a comparatively large lake, said to measure seventy-five miles each way, in spite of the fact that the populous towns of Lulan and of more remote regions diverted much more water than now. Next, during the early centuries of the Christian era, there is a decrease in the recorded size of the lake, even though the towns of Lulan were being abandoned and their water was being set free to reinforce the lake. Then, in the Middle Ages, there was an expansion of the lake, which cannot have been due to diminished use of the rivers for irrigation, for the population of the Lop basin at that time was greater than now, though not equal to that of the flourishing Buddhist times, a thousand or more years earlier. Finally, during the last few hundred years there has been a decrease both in the size of the lake and in the population about it. If Lop-Nor alone is considered, this sequence of events is not proved by compulsory evidence in all particulars; but it fits the facts better than any other theory as yet suggested. And, more than this, it agrees with all the data which I gathered from the whole of the fifteen hundred miles of longitude and four hundred of latitude of the Lop basin, and from Kashmir. All the facts are explicable on the theory of a secular change of climate from moister to drier conditions, with a rapid intensification in the early part of the Christian era and a slight reversal in the Middle Ages.

THE MOVEMENT OF LOAD IN STREAMS OF VARIABLE FLOW.

BY

ROBERT MARSHALL BROWN.

The problem of the low-water stages in streams of variable flow is concerned with the use of the river as a highway. A highway for the products of the country, and especially for the staples of trade, must be open to traffic at the same time with competing lines. Untoward accidents, which are confined to one line of trade and which are so frequent as to cause a feeling of uncertainty concerning the possibilities of an uninterrupted transfer, operate against the business of any trade route. The low-water season of a navigable river may be a period of difficult, if not impossible, navigation. Apart from the chance that the amount of water may so decrease as not to yield a sufficient depth for navigation, there is generally a dissipation of the power to maintain a channel of a low-water stage because of the overloaded condition of the river during successive stages of fall. Oftentimes so rapid is the decline in stage that bars are formed which distribute the flow over extensive areas of shoals, and the low-water channel becomes annihilated. The deposition of detritus has been studied under various phases. Many methods of maintaining a low-water channel and counteracting the influence of bars and shoals have been tried. Three different methods are now in extensive use. Streams differ so widely in all the factors which influence the deposition of load that no one method is expected to be applicable with the same degree of efficiency to all streams. The presentation of the various factors in deposition of load may be found herein as well as the attendant results upon navigation, the regulation of streams, and the success in maintaining a navigable channel. As the measure of a stream's deposit is ordinarily given in terms of navigability, and the operations against the deposits are largely directed toward the maintenance of a highway, it seems advisable to include in this paper a statement, of such length as to do justice to the situation, of the works of regulation, in the belief that additional light may be thrown upon the problem of deposition of load.

WAVE-LIKE MOVEMENT.—The Mississippi River Commission during 1882 reported* on the movement of detritus. They hold, among other things:

That the bottom of the river is in an unstable condition and constantly in a state of motion;

That the bottom of the river consists of a series of transverse ridges approaching the form of waves under their most favourable development. These waves have an irregular motion down stream. Their maximum size and rate of progression agree in time with the river's highest stand. Their movement is fastest in mid-current and diminishes with the increase of distance from this channel. The waves have the minimum rate of progression and size at low water;

That the heavier material moved by a river is pushed up the up-stream side of a wave by the force of the current and rolls down the down-stream side. Here it remains until the wave has progressed down stream over it, when it is again exposed to the action of the current;

That the waves retain their form under uniform conditions of flow, but are obliterated by a sudden decrease of velocity of the river, because of the large increase in deposition of sediment.

The extreme conditions affecting the bed of a river would be realized under a moderate and uniform drop of the river from its flood stage to its normal low-water stage, and under a sudden drop of the river between these two stages. In the former change of stage the waves of sand would grow uniformly less in size, be more evenly distributed along the river, and, while their number might be increased, they would not, except at an abnormally low stage, block the channel of the river. Under the latter condition the decrease of velocity is sudden, and the detritus cannot assume a shape of deposit which has any suggestion of order, but is dumped in varying amounts along the river bed. The sediment, which under a slower decrease in stage would be widely distributed, upbuilds temporarily the bed of the stream and obstructs the flow. As a rule the bends of a river, because of the forced confinement of the flow, yielding a swifter current and a greater depth than is found in other parts of a stream, sweep clean their channels. The crossings and straight reaches receive heavy deposits of sediment; the river is spread over a wide and shallow lying bar at these places, and is no longer able to scour a channel.

* Report of the Mississippi River Commission for the year June 30, 1882, p. 88.

UP-BUILDING OF BED.—The deposit found in a stream under low-water conditions is not permanent. The next flood stage starts the detritus down the stream. The tendency is that a stream under high-water conditions, because of its depth, will scour the bed deeper than under a more natural flow. The limit of scour is reached when the load which is rolled along the bottom begins to tax the transporting power of the river. A river under an irregular flow along a gradual slope cannot build up its bed. That a river does this thing has been used as an argument against the permanent protection of alluvial plains by embankments. The deposit under low-water stages does not concern in any direct way the constructors of levees; under a high-water stage there is little or no deposit, for the detritus is in motion. The striking feature of the flood of 1897 on the Mississippi River* was the greater height of the flood wave in the lower portions of the river than the stage at the upper river stations led the engineers and the riparian proprietors to expect. The proposition was established, furthermore, that this feature was not abnormal, but, on the contrary, such a change in the regimen of the river had taken place that any flood wave passing Red River Landing (765 miles below Cairo) at a high stage may be expected to cause a flood wave at Carrollton (950 miles below Cairo), a foot or more higher than a flood of the same height would have caused fifteen or twenty years ago. The explanation of this change in flood height has been that it resulted from the up-building of the river's bed, and in this particular case that the bed was filling about and below Carrollton. If such were the case, it is obvious that the effect in the instance of low flood waves would be proportionally more noticeable than in the case of the high. Tables of low flood waves show no tendency whatever towards an increase in the height of the low flood wave at Carrollton, and the theory of a filling channel must be abandoned. This conclusion is reached somewhat as follows. The floods which have been recorded since 1872 at Red River Landing and Carrollton, and having gauge readings at the former station of 22.3, 21.4 and 19.3 approximately, are tabulated. The ratio of the Carrollton stage to the Red River Landing stage is calculated in each instance. The ratios of the stages about 19.3 are found to be uniformly less than those of the other two stages, and, furthermore, the ratios have decreased somewhat during the later years. The argument is enforced by the discussion of other factors which may be instrumental in yielding the increasing flood stage at Carrollton. This feature may be the result of the closure

* Report of the Mississippi River Commission for the year ending June 30, 1900, p. 4551.

of crevasses in the river below Red River Landing, but there is no evidence in support of this hypothesis. Certain conditions have increased the carrying capacity of the river above the stage of a moderate flood above Carrollton, and to this is due the increase in the high flood stage at Carrollton. The immediate result of an increased carrying capacity between Red River Landing and Carrollton was a distribution of the flood waters, and this was evidenced in a diminution of the high-water slope. This would not be felt at Carrollton in any such marked degree as at Red River Landing. At the latter station a lower stage would be recorded than under a similar flood a few years previous. It is not so much that the flood height has been increased at Carrollton as that it has been lowered at Red River Landing.

The Rhine has been constrained by levees for a number of years, and no change in bed-height is noticeable. Conflicting reports reach us concerning the Po. Some rivers of Japan are reported to have raised their beds. These occur, however, on alluvial fans where protecting embankments have been built, until in some instances the river is forty feet above the plain. Harcourt says* that the railroads across these plains have been placed in tunnels on a level with the surrounding country and underneath the stream. Thus is avoided not only the inconvenience of floods, but also the constant demand for regulating the road-bed to the caprices of a shifting and up-building alluvial fan. The case of the Hoang-ho is similar. The levees were placed on an alluvial fan where the change of velocity of the mountain stream debouching onto the plain resulted in the aggradation of the river-bed. So, to revert to the Po, it may be found that where the river and its tributaries leave the Alpine slopes for the lesser slopes of the plains of Piedmont and Lombardy, if constrained by levees, a rising of the river-bed must result. When the river has passed completely beyond the bounds of the condition favourable to fan formation, the detritus is probably transported, as in other streams of gentle slope and irregular flow.

SCOUR AND FILL SURVEY.—Covering a period of fifteen months, a board called the Scour and Fill Survey† ascertained by many soundings the nature and extent of the changes occurring in the bed of the Mississippi River within a limited area. Their findings are here briefly summarized. The location of the work was a bend

* Harcourt, L. F. Vernon. *Rivers and Canals*. Vol. I., p. 167.

† Report of the Mississippi River Commission for the year ending June 30, 1901. 128.

and a reach heading at New Madrid, Missouri, and extending downstream for about six miles. The stretch was divided into its pool and crossing sections, and sections intermediate between the two. The record gives us data for low-water stages and medium-water stages. A high-water stage did not occur during the interval of the board's existence. In the low-water stage the pool sections showed a tendency to fill during the earlier part of the rise of water during the season of observation, the cross-sections at high-water stages being only slightly larger in area than those of the low-water stages. The crossing sections showed opposite tendencies. On a rising stage these sections showed a scour; and a fill on a falling stage. During the intermediate stages it was noticed that the width of the pool sections was increased proportionally much more than the areas, and that the mean depth was decreased. The character of these sections was changed by extending them over the wide sand bars. Therefore the sections under this stage were considered in the same class, and the result was the same as for crossing sections. The results of the observations at this point showed that beginning with low water, and extending through a period of moderate high water, the pool sections decreased slightly, and the bar sections increased slightly in area. Secondary rises in a river tend to rearrange the detritus deposited during the general fall in stage and set it in motion again. Such rises are, then, favourable to the maintenance of a navigable channel so long as the rising stage continues. When this ceases and the fall of the river begins, a second deposition of the load takes place. The more gradual the decline in stage, the better is the distribution of the load along the bed, and navigation is therefore less likely to suffer. As far as can be discovered, advantageous conditions during a rising stage presage nothing concerning the conditions during the subsequent fall in the stage.

REGULATION OF LOW-WATER CHANNELS.—Works of regulation are not necessarily connected with the detritus of a river, but in most cases they have some relationship to it. The necessity of regulation, if the river is to be a highway, arises, first, from the lowering of the river stage during the drier seasons of the year; and, secondly, from the temporary up-building of the bed, due to the lessening capacity of the river for sediment during its decrease in stage. Under our title, the first factor always obtains; the second may or may not be active in an appreciable degree. A river varies from year to year in the openness of its low-water channel. The condition of one year is no sign or promise of what the channel

may be in succeeding years. A year may pass when the river is open to navigation with no regulation. This may be the result of a slow decrease in stage during the summer and fall, or of favourable rises of the river during the low-water season. Again, a year may be marked by continual and persistent deposition, so that the efforts to keep the channel open are unavailing. English engineers consider it sufficient to regulate a low-water channel in reference to normal low water. Excessive low water is so infrequent, and works of regulation are so expensive, that the outlay during extreme stages does not seem consistent with the broadest management. In the case of any river, such a policy during the first years of the work may be detrimental to the plans by discouraging shipping or blocking legislative appropriations, unless navigators, engineers, and shippers agree on what constitutes abnormal low water for the river in question.

Three methods are extensively used for regulating a low-water channel—confinement of channel, canalization, and dredging.

REGULATION BY CONFINEMENT.—For a number of years previous to 1897 a plan was projected to confine the Mississippi River during the low-water season between levees 3,000 feet apart. Considerable uncertainty existed concerning the feasibility of the plan. The opinion which prevailed was against such a procedure, on the ground that the low-water channel does not necessarily agree with the high-water channel, and this disparity of current-location would probably make the low-water levees a focal point of large deposition, which could not be removed during the falling stages. Portions of the Rhine River have been opened for commerce by such means. The Rhone * has the disadvantage of a strong current, so that the up-stream navigation is carried on with considerable difficulty. Between Lyons and the sea, training levees have confined the waters during low-water stages and thereby decreased the deposit of sand-bars. Some German rivers, notably the Elbe, are other examples of the regulation of the low-water stage by confinement levees. This method does not yield in the cases cited a depth of more than six feet throughout the length of the regulated water-way. If the low-water levees are so located as to maintain a steady flow of water during the drier season, the detritus is kept in motion, and is thereby nearly eliminated as a factor. Then the possibilities of navigation hinge almost entirely on water volume.

* For my data concerning European rivers, I have drawn upon Harcourt, *opus cit.*

REGULATION BY CANALIZATION.—The canalization of rivers has been more successful than confinement in improving low-water navigation. By this method the flow of water is practically stopped and navigation is equally easy up or down stream. The use of locks and dams in rivers of slight slope, where the disparity of width between the high- and low-water stages is not great, is less expensive than continuous training works. On the Seine there are locks $13\frac{1}{2}$ miles apart, and this yields a depth of $10\frac{1}{2}$ feet— $1\frac{1}{2}$ feet deeper than is considered necessary on the Mississippi River. The Main, a tributary of the Rhine, has been tried by both methods, and the regulation by confinement was abandoned in favour of canalization. In the former case less than a three-foot channel was realized; a six-foot channel was obtained by the aid of locks. The tonnage of traffic under training-works and under canalization was as 1 to 25. This method of regulation is also in use in the United States. In a canalized stream the stoppage of flow is beneficial to navigation on the whole. Furthermore, the retention of the waters by dams promises a more constant waterway than that under confinement levees. However, when traffic is heavy there will be a considerable drain of the water supply, and, during a low-water stage, this loss of water is liable to become serious. In the rivers above mentioned the amounts of sediment transported are not large. Notwithstanding, some dredging has been done in the Seine. The effect which locks and dams would have in a river carrying a large amount of sediment is problematical. That the detritus would impair the efficiency of such regulation is obvious.

REGULATION BY DREDGING.—This method of regulation is a direct attack upon the deposits, and is the one in operation on the Mississippi River. As some idea of the amount of deposits and their distribution may be gained from the work of the dredging parties, the experiences and operations during the dredging season on this river are dwelt upon to some length.

The immediate result hoped for in the dredging project is a channel from Cairo to the Gulf, with a width of 250 feet and a depth not falling below 9 feet throughout the year. In order that this may be accomplished, rapid surveys must be undertaken from the beginning of the flood decline, especially at such localities where shoaling is expected, so that the dredges may begin the work of deepening and widening while the conditions are still in excess of the minimum needs. In the carrying out of the plan, the greatest responsibility rests on the engineer who locates a channel

through a shoaling area. This location, to be successful, must be the path which the river will take during its low stage. To infer this path during a falling stage is not always possible. There may be more than one locality where a channel, opened, would lead the current of the river; but this, furthermore, is in the project—namely, that the channel be at least maintained, if not improved. A channel with a developing tendency towards crookedness offers an uncertain pathway for steamers; consequently an effort is made to keep the cuts as straight as possible. While in the main the channels are confined to the cuts prepared for them, there arise instances, here and there, where the tendency during a certain stage gives little promise of what it will be at a lower stage. At Corona Crossing last year (1905), after some uncertainty, a channel was located and dredged. The selection of the location proved to have been unwarranted and the location was abandoned, and a second location selected and dredged. This latter cut appeared to be successful, as far as the required depth of water was concerned, and there was considerable promise of its maintenance by the river. Unfortunately, it was located in such a way that it led steamers passing through it too near a bar, and was, therefore, abandoned. A third channel was dredged with eminent success. Even in this instance there seemed to be a feeling that this last location could have been made at the beginning, if the study of the silting processes had been properly interpreted. A few instances are recorded where a channel was opened and never used, as the river made another. At New Haven, in 1905, the channel followed the concave shore. As shoaling was feared on account of the caving, a new channel was dredged away from the shore. All the while the shore channel improved, and, as the steamers found that it was easier to run, the new channel was never used.

The magnitude of the work may be apprehended by a review of the operations at one or two localities of continual dredging. These indicate areas not only of large deposits, but also of a dissipation of stream power, so that there is a failure to maintain a channel, one factor being a concomitant of the other.

The range from Darnells Crossing to Bixby Towhead and Point Pleasant has been a troublesome spot. This locality is five miles below New Madrid. The river as it approaches this place broadens, and at Darnells Point the river bifurcates. For seven years this two-mile stretch of river has given considerably more than the average amount of trouble. During 1899 it was considered the most difficult of all places for the year. An attempt was made to

regulate the channel by fixing the flow by dikes. The dikes were intended to check the caving of the banks and bars and to close one of the channels of the river, the one to the left of Bixby Towhead. It was expected that these dikes would turn the waters of the river to the right channel, and that the narrowing caused thereby would be instrumental in making and maintaining a straight channel. The results of the work were not entirely satisfactory. The dikes failed to secure a channel. A channel had to be dredged to assist the dikes; even then the cut was not what was desired, being crooked, narrow, and hard to run. During 1900 this locality is again rated as the most difficult of any for the season. Much of the dike system had been destroyed by the preceding high water, but, somewhat in compensation, the river had taken the desired path, and, after some dredging, maintained a way through the cut. During 1901 no dredging was necessary at this place. During 1902, however, the previous record of the station was equalled, and more work was done at this locality than at any other station during the season. The hydrograph for 1902 shows two very definite rises of the river, one in September and another in October. The fall in stage in each case filled the channels with sediment. In general the river here was broad, and the channel unstable and shallow. Although the low-water season of 1903 was marked by an almost clear channel until December, the records indicate trouble from the apathy that resulted from lack of work. Dredging was carried on at the Towhead during August, September, and October, mostly during a too high stage of the river, in anticipation of trouble. The work was not effective, and the dredging was continued through November. When low-water did come on December 5, the long waiting for work found the operatives unprepared, and the season was closed under unsatisfactory conditions. At Darnells Crossing, while dredging was needed on December 10, no dredge was ready, although they were not in use, until the 28th. A little dredging was done at the close of the year, but the winter rise came to the relief of the dredges and ended the season. During 1904 considerable dredging is recorded at this station.

Another condition is illustrated by the results at Hathaways Crossing and Island Number 40 Crossing. The former is a broadening of the river below a bend, and acts somewhat as a lake in catching detritus. The latter is near a separation of the channel caused by Island Number 40 or Beef Island. Hathaways Crossing was, previous to 1899, one of the most difficult to cut and maintain. During 1899 and 1900, neither of these crossings demanded dredg-

ing. This freedom from trouble was considered a resultant of the previous season's work, and the belief was current that "where no radical change takes place in the river, and where a dredged cut fills up during the high-water season, this filling is looser and less compact than at other places on the crossing, and that the river during subsequent low-water periods finds it easier to make its way through these cuts than elsewhere across the bars." In the years subsequent, the Beef Island Crossing has given no further trouble. Hathaways was dredged three different times during 1901, was considered second in point of troublesomeness during 1902, and was dredged continually during 1903. During 1904, it gave no trouble. There seems to be little hope that a season's dredging will result in a better channel during a subsequent year. The two cases above cited seem to be over-emphasized, the only instances of the kind during seven years. As far as Beef Island is concerned, the tendency of the river was to flow through Beef Island Chute to the exclusion of the wider and troublesome crossing. This chute is narrow, and as soon as a proper amount of water flowed through it the confinement of the water was instrumental in holding a channel.

The amount of dredging depends on the length of the low-water season and whether the season is broken by secondary rises. Any hope that there may be a relief from dredging must be shattered when the records of the seasons are studied. In the 1904 dredging season, more dredging was done than during any of the previous seasons; during this season more dredging was done than during 1902 and 1903 combined. This may be accounted for by the length of the season. Medium low-water stages were recorded earlier and lasted longer than for any other year of the dredging operations. The number of hours of dredging was twice that for 1903 and 30 per cent. greater than for any previous year.

LOCATION OF DEPOSITS.—Deposits occur in a meandering river at the ends (toe-caps) and the down-stream side (scrolls) of lobes. Where a river does not meander, the current crosses and re-crosses the river and there is developed a cutting, a filling and a crossing action comparable to the more strongly-marked features of the meander. Especially where cut-offs have occurred this cutting and filling action is prominent for many miles above and below the location of the abandoned meander. The process of widening the meander belt by the cutting and the consequent filling on the opposite shore along the pathway of the withdrawing stream is not of any considerable moment to navigation. In these localities the river maintains a navigable depth as long as the stage permits

navigation. It was found in the Brazos River in Texas* that the average width of bends in the river was $7\frac{1}{2}$ per cent. less than in the reaches, while the average cross-section in bends was $13\frac{1}{2}$ per cent. greater, making the average maximum depth in bends 58 per cent. greater than in reaches. The deposits of the toe-cap and scroll varieties are not, then, essentially a hindrance to navigation. In the same class would fall the fills subsequent to cut-offs. It is in the crossing sections that trouble arises. During the last seven years of dredging on the Mississippi River there appear to be eight stretches where considerable work was demanded. These may be placed in three categories—namely, resultants from cut-offs, separation of stream, and widening of stream. The instability following the precipitation of a cut-off is felt over a greater reach of river than is the experience under the other two causes. In the case of Commerce cut-off, twenty-five miles of the river are now of uncertain navigable quality; while in the Centennial cut-off region, fifteen miles are in a similar condition. The Needham's cut-off region, with a seven-mile stretch, because of the time elapsing since the cut-off occurred, is placed in another category. After a cut-off has occurred the process of cutting and filling which results increases the number of crossings above and below the abandoned meander. In this increase in the number of crossings may lie a reason for the large amount of deposit during a falling stage of the river. The widening of the stream and the separation of a stream by an island are not necessarily of different origin. The one state may be a later stage of the other. The river as it leaves a pool section in four or five instances on the Mississippi River increases in width from half a mile in the bend to two miles a short distance below. The Gold Dust Crossing is a good type of this thing. It in its most troublesome section contains islands also. It was here that experimental dikes† were constructed to shut the river out of one of the channels, thereby lessening the width of flow, in the hope that the river would maintain a cut in the other channel. The experiment was not considered a success, although the conditions were ameliorated for the time being in one or more localities. Stretches of river of eight miles and less, with dredging demands for every mile and in each instance a broadening of the river to three times its width where it leaves the pool section, make up the remaining six dredging sections.

The prediction of localities of filling is not difficult. Most con-

* Tidal Rivers. W. H. Wheeler. 1893, 56.

† See Report of the Mississippi Commission for the year ending June 30, 1901, 235, 245.

ditions of deposition are definite enough to arouse suspicion. Success in maintaining a navigable channel does not rest on the foretelling of locations where trouble is likely to ensue. It rests on locating the place where the river is most likely to maintain a channel through the detritus. This can only be known by carefully watching the tendency of the stream as it moves over the shoal during all its time of falling stage. Even then there is always the chance that the quantity of water may fall short of the minimum demands for navigation.

WORCESTER, MASSACHUSETTS.

THE ASCENT OF RUWENZORI.

The Duke of the Abruzzi lectured on Jan. 12 before the Royal Geographical Society of London on his recent expedition to the Ruwenzori range. King Edward VII was present. This was the first occasion on which a reigning British monarch had attended a session of the Society, though as Prince of Wales the present King had frequently been at the meetings. One of the fine photographs with which the Duke illustrated his paper in the *Geographical Journal* (Feb., 1907) is here reproduced. It shows some of the highest mountains which constitute the culminating portion of the Ruwenzori range.

At the outset the party lost the services of Captain Cagni, who was to have charge of the magnetic observations. Unfortunately, he was attacked with typhoid fever before reaching the mountains. Lieutenant Winspeare, who was to direct the meteorological and topographical observations, was also incapacitated by illness. The Duke's assistants included Dr. Major Cavalli Molinelli, physician, zoologist, and botanist; Signor Sella, photographer; Dr. Roccati, geologist; two Alpine guides and two head porters from Switzerland, an assistant photographer, a cook, and about 200 Waganda porters.

The neighbourhood of the mountains was reached on June 1, and about seven weeks were given to mountain-climbing, exploration, and surveying. The failure of previous attempts to reach the culminating points of this range may be attributed to the lack of mountaineering experience. The expert snow-climbers in the Abruzzi party had no difficulty in their ascents either on rock or ice, and the snow was always in good condition. The Duke has

named the massifs, calling a number of peaks after explorers, and has also given names to the peaks. He says:

I propose, therefore, to call Mount Stanley the mountain or massif that carries the five highest peaks—Margherita (16,816 feet), Alexandra (16,750 feet), Elena (16,388 feet), Savoia (16,340 feet), and Moebius (16,214 feet). To the second group in order of height, the Duwoni, seen from Ibanda, I give the name of Speke, in memory of the discoverer of the Ripon Falls, the origin of the Nile; and the highest peak of this massif I call, after the King of Italy, Vittorio Emanuele (16,080 feet); and the lower and more southern, seen from the lower Mobuku valley, I name after Sir H. Johnston (15,906 feet). To the third massif (Semper, Kiyanja, or Ngenwimbi) I give the name of Mount Baker, in memory of the traveller who discovered Lake Albert and was the first to see these mountains, calling its highest point (15,988 feet) after the King of England, and the lower, to the west, we first climbed, Mount Semper (15,343 feet). The fourth massif I call Mount Emin, after the traveller who succeeded Stanley in this region; its highest points Umberto (15,807 feet) and Kraepelin (15,752 feet). The fifth massif I name Mount Gessi, after the Italian traveller, who first circumnavigated Lake Albert; and I name the two points of this group Yolanda (15,647 feet) and Böttego (15,483 feet). To the sixth massif I give the name of Thomson, in honour of the traveller to whom we owe the progress of civilization in these countries,* naming its peaks Weismann (15,273 feet), Sella (15,286 feet), and Stairs (15,060 feet). For the point climbed by Dr. Wollaston, and thought by him to be Duwoni (15,286 feet) I propose the name of its climber; for the northern top (15,269 feet) that of Moore; the name of Cagni for the rock-peak opposite Bujongolo (14,826 feet).

I have left their native names to the valleys, torrents, and lakes, where these had any single name given them by the Bakonjo; where they differed, and in the case of all the valleys, lakes, and torrents on the Semliki slope, of which the Bakonjo know little, I have given no names.

I have called the passes we visited after Freshfield, Scott Elliot, Stuhlmann, Cavalli, and Roccati, leaving nameless the gap between the Yolanda Peak and the Portal Peaks, because I could not exactly determine its position. These passes range between 13,780 and 14,180 feet, except the Stuhlmann Pass, which is slightly lower.

The watershed runs from the Weismann Peak over the Freshfield Pass to the King Edward Peak; follows the crest to the east as far as the Scott Elliot Pass, to climb over the summits of Mount Stanley, then by the Stuhlmann Pass to the Vittorio Emanuele Peak, whence by the Cavalli Pass to the Umberto Peak, and so by the Roccati Pass to the Böttego and Yolanda summits. It then follows the ridge that drops from the Yolanda to the south-east to join the Portal Peaks, and from these turns again north-east.

The lowest point of glacier was 13,677 feet. All the glaciers show signs of receding. No glacier is of the first order, all being, without exception, of the secondary order, without tributaries, recalling the glaciers of Scandinavian type; but there are evidences of enormous glaciation in the Glacial epoch. There is no *névé*. The limit of perpetual snow is about 14,600 feet. The area permanently covered by snow has a radius of some five miles from its centre. The temperature upon the highest summits varied between a maximum of 42.8° Fahr. and a minimum of 26.6°. The chief difficulty experienced was the weather, which was scarcely ever clear. Even when the weather was fine, the distances in the views from the higher peaks were always more or less veiled by haze, which made it difficult to determine the direction of the valleys falling towards the Semliki.

The theory of volcanic origin for the range may be excluded. Only at one place were local traces found of basaltic veins. The dip of the strata is inclined up to 60°. The origin of the moun-

* As the Duke of the Abruzzi did not give his own name to any part of the Ruwenzori range, the President of the Royal Geographical Society later substituted for the name Mount Thomson the name Mount Luigi di Savoia.

tain group and of the high peaks of the central portion may be attributed (1) to an upheaval *en masse* of a portion of the archæan floor of Central Africa; (2) to a highly-accentuated ellipsoid of upheaval or anticlinal with strata more or less strongly tilted in the Ruwenzori group, an ellipsoid having its general direction north and south; and (3) to the presence in the heart of the group of amphibolites, diorites, diabases, and amphibolitic gneiss, well

MOUNT STANLEY.

Queen Alexandra Peak.	Queen Margherita Peak.	King Edward Peak.
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THE HIGHEST PEAKS OF RUWENZORI.

adapted to resist denudation by surface agents, both physical and chemical, to which the gneisses and mica-schists of the outer ranges offer far less resistance.

The Duke of the Abruzzi and his companions succeeded in all the objects of their expedition, making an exact survey of the range, determining the height of its several summits, fixing the watershed, and bringing back, besides their maps, an admirable series of photographs by Signor Sella.

GEOGRAPHICAL RECORD.

AFRICA.

THE GREAT CONGO FOREST.—Mr. J. Penman Browne, who recently travelled through the Ituri forest along the upper Ituri River, in the northeastern part of the Congo basin, has an article on the forest and river in the *Scottish Geographical Magazine* (Feb., 1907). He says that the forest offers immense possibilities to the naturalist. It has an area of some hundreds of square miles, and is inhabited only by Pygmies and, around its fringe, by rubber-hunters. Parts of it contain many valuable woods, such as African mahogany, teak, greenheart, camwood, copalwood, ebony, ironwood, and many species of *Landolphas* (rubber vines). Orchids are very numerous, and ferns are plentifully distributed. The Belgians have surveyed a railway through the forest; but the exploitation of this region need not wait for the construction of this highway, as a part of the forest is in close proximity to the Albert Nyanza. Timber and produce could be shipped across the lake to Uganda or taken down the Nile.

That rare and beautiful animal, the okapi, finds a home in the forest, where it is next to impossible for a white man to hunt among the dense growths. The okapi, therefore, will be safe from extermination for many years to come. The Pygmies say that, if disturbed, the okapi does not run far, and that its habits are similar to those of a forest hog. It is often found wallowing in a mud puddle. It feeds on young shoots and shrubs and on succulent roots, which it digs up with its forefeet.

There are a great many small animals in the forest amid the dense undergrowth, where no large or medium-sized animal could force a way. The known natural resources of the Ituri are rubber and timber in the forest regions, native grain, bananas, etc. Gold is as yet the only valuable mineral discovered.

NOTES ON THE GEOLOGY OF THE CONTINENT OF AFRICA.—The Topographic Section of the General Staff, War Office, Great Britain, sends to the Society this compilation of the geology of Africa made by Mr. Alexander Knox, Map Curator in the Department of the General Staff. The writer summarizes, in 36 pages, our present knowledge of the geology of Africa, with copious references to authorities on the page margins. This is followed by 329 "Notes" on the geology of many hundreds of districts, large or small, giving in each case the authority on which the note is based. Accompanying this section is a map of Africa on which the number of each note is printed, so that the reader may easily see to what particular district in the continent each note applies. A long bibliography of the geological literature of Africa, scattered through books, reports, and periodicals, is appended. The index of names makes it easy to find all references to every region, every mineral, and geological formation mentioned in the work. The volume, which has evidently been prepared with great care, will be invaluable to all students of African geology.

THE SUDAN ALMANAC FOR 1907.—This little annual, as usual, is packed with information of importance for the region it serves, and also of interest in other countries. It gives the population of the Sudan at about 1,500,000 to 2,000,000. The present population of Khartum is 14,023; Omdurman, 39,916; North Khartum, 3,664; suburbs, 16,901. The total length of the Nile from Victoria Nyanza to Damietta is computed at 3,526 miles.

GOVERNMENT FARMS IN RHODESIA.—The last annual *Report* of the British South Africa Company says that central farms have been established at selected places in the Marandellas, Sinoia, and Umtali districts, at which intending settlers may, when they desire, acquire cheaply the necessary training and experience before embarking their own capital. By these means it is hoped that a continuously increasing number of farmers of the right class will be placed upon farms. A number of intending settlers are already working at the central farms. The acreage under cultivation shows a large increase, and the agricultural exhibitions recently held in Rhodesia are evidence of the growing attention to improved methods and the adoption of the best agricultural machinery.

Matters seem to be less promising in other parts of Rhodesia. Mr. Vincent Dickens, in his paper "Journeys in South-eastern Mashonaland" (*Geog. Jour.*, January, 1907), says that during his residence of nearly eight years in Southern Rhodesia he has visited all parts of the country and finds that it has a great deal of malarial fever and black-water fever. He believes that white men cannot safely settle in Mashonaland and make homes there as in other English colonies. Farming hardly pays, as the expenses are great, and the natives can raise all the grain required far more cheaply than the white man is able to do. The country is very suitable for cattle and sheep farming, the grass being sweet and cattle thriving well on it. Many stock-raisers would settle there if the prevalent cattle diseases could be rooted out. Gold mining is gradually increasing throughout the west and north of Mashonaland and Matabeleland, which are more largely populated by whites than the south-east. It is believed that there is a good mining future before the country.

AMERICA.

RECESSION OF NIAGARA FALLS.—Under this title Dr. G. K. Gilbert has recently published a paper of more than ordinary interest.* In view of the very great geological interest in the rate of recession of Niagara, and because of the fact that this rate is now beginning to be seriously interfered with by the withdrawal of Niagara water for power purposes, Dr. Gilbert decided that the present was a favourable time for a careful consideration of the problem, which has previously been attacked by various workers, thus gaining valuable data which in the future diminished condition of volume cannot be obtained.

For this purpose Dr. Gilbert has had made a new survey of the Crest line of the Falls (by W. Carvel Hall, June, 1905), and has compared the present outline with that of previous surveys, including the earliest made under the direction of James Hall, in 1842. He has also extended the comparison of the present form back to the date of the camera lucida drawing by Captain Basil Hall in 1827. In this connection Dr. Gilbert has reoccupied, as closely as possible, the site from which Hall's drawing of the Horseshoe Fall was made, and from it has taken a photograph. He has also photographed the American Fall from the sites occupied by Hall in his camera lucida drawings of its crest line. These photographs are reproduced on pages opposite the reproduction of the camera lucida drawings, and the results of the comparison are carefully discussed in the text.

Comparing the surveys of 1842 and 1905, Dr. Gilbert finds that in the interval of 63 years there has been an average annual recession of about 5.3 feet in the Horseshoe portion of the Fall. The American Fall, with its much smaller volume, and with its protection of limestone blocks at the base, shows that the recession is not

* Bulletin U. S. Geological Survey, Number 306.

"so great as 0.5 foot per annum, and is probably as small as 0.2 foot per annum, or about one twenty-fifth of the rate of recession of the Horseshoe Fall."

The author finds unquestionable error in the 1842 map of the American Fall, which naturally brings in question all the other results of the survey of that year. For this reason the use of Captain Basil Hall's sketch is of some importance. On this point Dr. Gilbert speaks as follows:

The general tenor of the evidence, including the five surveys and the Basil Hall sketch, leaves no question that the annual rate of recession has been about 4 or 5 feet. If full authority be ascribed to the map of 1842, the estimated annual rate of recession is 5.3 feet. If full authority be ascribed to the tangent line, based on the sketch of 1827, the estimated rate is about 1 foot less. It is my opinion that the map affords the better record. Giving to it the greater weight and to the tangent a smaller weight, I think the best practicable estimate on the rate is between 5.3 and 4.2 feet, but nearer to the former; and I select 5 feet partly because a statement in even feet avoids the implication of high precision which might be suggested by a decimal. As an estimate of the average rate of recession during the period of definite observation, I think this can not be in error more than 1 foot. . . . The rate of recession of the American Fall during the seventy-eight years from 1827 to 1905 was less than 3 inches per annum.

The time consumed in the recession of the falls from the escarpment at Lewiston to their present position, or the age of the river, is not here estimated. It can not properly be computed without taking account of all conditions, local and temporary, affecting the rate of recession, and some of these conditions have varied greatly from point to point and from time to time.

Besides being illustrated by a number of excellent half-tones and by several diagrams, the paper contains a map showing the crest lines of each of the surveys from 1842 to that of 1905. In an appendix the engineer, W. Carvel Hall, describes the methods employed in his survey.

R. S. T.

CLIMATE AND THE SALTON SEA.—A good deal has lately been printed in American newspapers concerning the supposed effect of the new Salton Sea upon the climate of Arizona and of other more distant localities, even as far as New Mexico and Texas. It is obviously absurd to look for any such influence, and it is well to give wide publicity to the statements on this point by Arthur P. Davis, Assistant Chief Engineer of the United States Reclamation Service, published in an article on *The New Inland Sea* (*Nat. Geogr. Mag.*, Jan., 1907). Mr. Davis points out that the great inland Gulf of California, hundreds of times larger than the Salton Sea, has no very marked influence upon the climate. "Those who hold this idea [of change of climate] apparently ignore or neglect the fact that the same causes that have led to the creation of the Salton Sea have led to the cutting down of the bed of the Colorado River and the prevention of its normal annual overflow at Yuma, and all points below there. The great delta, therefore, which is annually overflowed under normal conditions, has received no such overflow since the river has been running into the Salton Sea, at least during the past high-water season, and this fact itself would counteract any influence that might have been exerted by the evaporation from the surface of the Salton Sea."

R. DEC. W.

THE SALTON SEA.—An exceedingly clear account of the history of the distinctive changes in the Colorado River in southern California is presented by Mr. Arthur P. Davis in a recent number of the National Geographic Magazine (Vol. 18, 1907, pp. 37-49). Mr. Davis says that very nearly \$100,000,000 worth of property are in the balance. He points out that the existence of the depression in which the Salton Sea lies is due to the outward growth of the delta of the Colorado River, which has shut in what was once an expansion of the Gulf of California. In a humid climate this region, which lies below the sea-level, would be occupied by a large lake throughout its entire area; but in the arid climate of southern California evaporation prevents

the accumulation of water, except in the lowest part of the depression where the salt sea of Salton Sink lies. Into this sink the Colorado River has been in the habit of occasionally pouring its waters, the last time before the present being in 1891. With a large river to supply water, with a downward slope for the water to be led over, and with extensive areas of fertile land for irrigation, it is natural that the project of diverting a portion of the Colorado River water into this valley should have been undertaken. For a part of the distance the irrigation canal follows an old course of the Colorado, and by this means the divergence of the Colorado water has been made more easy. Nothing can prevent the Colorado from continuing its work of destruction, either now or at some future time, excepting the construction of extensive jetties to confine the river in its channel leading to the Gulf in all seasons of flood.

Mr. Davis' paper, which is illustrated with some excellent half-tones, shows clearly the enormous extent of the destructive work of this diverted river. The steep slope to the bottom of the sink, which lies about 300 feet below sea-level, has permitted the river to cut a deep gorge, which is being rapidly extended up-stream. If the devastation is permitted to continue the ultimate result will be appalling. Whether the entire sink would be filled with water is not certain because of the lack of knowledge of the annual discharge of the Colorado and of the amount of evaporation. By one estimate, Mr. Davis shows that the entire basin may be filled in a period of forty or fifty years; by another, the basin would never be completely filled, but, instead, would be occupied by a great lake fluctuating in level as the volume of the river varied. The results of either of these conditions, however, would be enormously destructive. The water would submerge 150 miles of track of the Southern Pacific Railroad, and, in the Imperial Valley alone, not less than 300,000 acres of fertile land, now occupied by a population of between 12,000 and 15,000. Fully as much land of equal value, across the line in Mexico, would also be submerged. Up to the present time much damage has actually been done, but only a beginning has been made to what may ultimately be accomplished if the Colorado is not made to remain in the channel which it has been following to the Gulf. It is truly a problem in which the Government is warranted in taking a hand.

R. S. T.

DEPTH OF DEATH VALLEY, CAL.—The U. S. Geological Survey has just completed a line of spirit-levels through Death Valley, and ascertained that the depression of that area below sea-level is not so great as was supposed. The preliminary figures for the lowest point give—276 feet. Bennetts Well, which is near this place, is 266 feet below sea-level. The final computations may slightly alter these figures, but they are probably not more than three feet in error. The Geological Survey now has elevation marks on the highest and lowest points of dry land in the United States.

It is a strange coincidence that these two extremes are both in southern California and only 75 miles apart. Mount Whitney is a foot or two over 14,500 feet above sea-level, while Death Valley is 276 feet below. Before the Salton Sink, also in southern California, was flooded by the Colorado River, it contained the lowest point of dry land in the United States—a spot 287 feet below sea-level.

Previous estimates of the depth of Death Valley based on barometer readings gave for the lowest point figures varying from 250 to 450 feet below sea-level. The level line of the Geological Survey is the first accurate determination of elevations in that locality.

THE FALKLAND ISLANDS.—Climatic influence on occupations and products, as well as on habits of life, is no better illustrated than in these windswept summits of

the otherwise submerged continental shelf lying eastward from southern South America. They lie in the belt of the prevailing westerlies, which are indeed "prevailing" here; for so strong is the wind and so soft is the ground, because of constant rain or fogginess, that no trees grow, and the land is covered with grass and moss. The latter has grown here for ages, and its partially decomposed remains have accumulated in extensive peat deposits. These beds can not only furnish fuel for the islanders, but also supply the growing demand on the neighbouring fuelless mainland.

The sheep-growing industry developed on the rich grasses leads all others in the islands. The chief products therefrom are skins, tallow, and wool; and the authorities are contemplating an improvement in the breed of sheep, to improve output and quality of wool, as well as the quality of flesh for eating. G. D. H.

WOLVES IN THE UNITED STATES.—Stockmen on the western cattle ranges have been suffering through depredations of wolves. The complaints of ranch men resulted last year in an investigation by the Government Forest Service, and the report prepared by Mr. Vernon Bailey has just been published as *Bulletin 72* of the Agricultural Department. A number of photographs show wolf dens in Wyoming and other western States and also views of wolf pups playing in front of the dens.

Wolves are still abundant in Texas, New Mexico, Wyoming, Montana, and other regions, and they are doing much damage. They have rendered sheep-raising practically impossible in eastern Texas. It is estimated that four wolves on one of the creeks near the Gila Forest Reserve in 1906 killed calves worth \$1,000. Arthur J. Tisdall, writing from New Mexico, calls attention to the excessive damage done by wolves all over the western States and Territories, and especially on the ranges, and expresses the belief that they are killing nearly 500,000 animals (?) annually, chiefly calves and yearling cattle.

In western North Dakota it is estimated that the annual loss is from 10 to 15 per cent. of the herds. Wyoming has in twelve years paid \$68,000 in wolf bounties, and yet the animals are still destroying much stock. Colorado reports that last year wolves were killing stock in six of the large grazing regions of the State. Similar reports are coming from other parts of the West, in spite of the fierce warfare waged upon the animals by ranchmen, trappers, and hunters.

A considerable number of colts and some grown horses are killed by wolves, but the loss is insignificant compared with that of cattle. Herded sheep are rarely troubled by wolves, but when they raid an unguarded herd the havoc is likely to be great. In large parts of eastern Texas, Louisiana, and Minnesota, few sheep are raised on account of the abundance of wolves.

Hogs are killed in great numbers by wolves in the timbered bottom and swamp lands of eastern Texas and in Louisiana and Arkansas. Many deer are killed, also, in the timbered regions of northern Michigan, Wisconsin, and Minnesota, and in parts of Canada, especially during the winter when snow is deep and domestic animals are housed. On Grand Island in Lake Superior, in January, 1906, a grey wolf appeared when snow was two feet deep and in thirty days killed thirteen deer and one caribou.

Government officials hold out no hope that the various kinds of wolves can be exterminated, at least for many years to come; but protective measures, including hunting, poisoning, trapping, and searches for wolf dens in order to exterminate litters of pups, are described in detail. The belief is expressed that, by organised and vigilant war upon the wolf, his depredations may at least be kept within bounds.

SILVER MINING AT COBALT.—In the "Summary Report" of the Geological Survey of Canada for 1906, Mr. A. P. Low, Director of the Survey, briefly describes his visit to the important silver camps about Cobalt, Ontario. Three days were spent in looking over a number of the most promising mines and claims of this remarkable camp. The question of the depth to which the silver will be found is important, but no opinion can be given with the data yet available. Granting only a very moderate depth, there is ore in sight sufficient to produce millions, and only a portion of the veins has as yet been uncovered. It is wise, however, to consider the very large capitalization and abnormal prices of stock of many of these properties. Attention is also called to the limited area covered by the silver-bearing veins in this region and to the natural impulse to consider properties situated in the vicinity of bonanza claims as being themselves of great value, when the reverse is often the case.

THE HAWAIIAN ISLANDS.—Attention is again called to this important "Cross-roads of the Pacific" by a half-dozen pages (91-96) in the November number of the Monthly Consular Reports. A glance at the Pilot Chart of the North Pacific, issued monthly by the Hydrographic Office at Washington, reveals the appropriateness of the phrase quoted. The islands are an intersecting point for sixteen great steamship lines that traverse this ocean, and their importance, politically and commercially, will be enhanced in a few years by the opening of the Isthmian Canal.

Honolulu is destined to be in the tide of the world's greatest commerce, because it is in the direct line from Vancouver and Seattle to Sydney, from San Francisco to the Philippines and Hongkong, and from Panama to Japan. It is on the chief lines of trade between Occident and Orient.

The Hawaiian Territory is chiefly a one-crop agricultural country. Sugar constitutes 95% of the exports. The cultivation of cane has reached a high degree of perfection, and, with many natural advantages, the plantations produce more cane to the acre and more sugar to the ton of cane than any other country of the world. Steam ploughs in the fields, and latest steam and electric appliances at the mills, irrigation works and costly pumping stations—these are some of the items which make this eminence possible.

Other industries now being tried are pineapple, banana, mango and alligator pear growing. These and other tropical fruits do well, but have not been pushed because the people were dominated by the one idea—sugar-growing.

G. D. H.

ASIA.

REPORT OF THE PHILIPPINE COMMISSION.—This Report (1906) says that the death-rate among American civilians living in the Philippines was only 9.34 per 1,000, while the death-rate among American soldiers was only 8.65. Final steps have been taken for the construction of between 700 and 800 miles of new railroad lines, which will open up much of the most populous portions of the archipelago. This work will be carried out by the Manila Railroad Company, and 428 miles of these roads will be built in Luzon. The Coast and Geodetic Survey completed 430 miles of coast surveys, making a total of 1,645 miles completed, or 14.3 per cent. of the coast-line of the islands. There were published in Washington eighteen new Philippine charts.

DR. STEIN IN CENTRAL ASIA.—In a letter, written in October last from Kiria to the *Geographical Journal* (Jan., 1907), Dr. Stein, the anthropologist, says that he began his journey southeast from Kashgar at the end of June. Khotan was the

intended starting-point of his archæological labours, and there was opportunity before entering upon them for geographical work. Surveyor Ram Singh carried a systematic survey, by plane table and theodolite, through a still unexplored section of the Tashkurghan River valley, and thence along the eastern slopes of the Mustagh-ata range to the latitude of Yangi-Hisar. Stein and Ram Singh then travelled from Yarkand by an unsurveyed route, east of the Tiznaf River, to the outer hills about Kokyar. On this route Stein collected anthropological measurements and data concerning the people of Pakhpo, a small but interesting tribe of Iranian speech, living in Alpine isolation, and closely allied to the Galchas of the Pamirs.

Ram Singh also surveyed another part of the difficult mountain range between the Kara-kash and Yurung-kash rivers, crossing the main range by the Hindu-tash Pass, which several Europeans had attempted in vain. The great valley of Pusha, to which this pass gave access, has extensive grazing ground, with an abundance of vegetation quite exceptional among those barren mountains.

From Khotan Dr. Stein and Ram Singh started for the high mountains south of that place, to supplement his surveys in 1900 with ampler details concerning the great glaciers which feed the headwaters of the Khotan River. They surveyed the imposing glaciers of the Nissa valley, and the equally large ones crowding the watershed above Karanghu-tagh. Many details were cleared up and the map of this mountain region will be published by the Royal Geographical Society.

Dr. Stein's archæological campaign fairly began in the desert east of Khotan. The excavation of a ruined temple on the Tati of Hanguya yielded many interesting small terra-cotta reliefs, the style of which was plainly derived from models of Græco-Buddhist art, agreeing closely with the Rawak Stupa reliefs dated approximately from the fifth to the sixth century A.D. Cultivation in the fertile Hanguya tract is now steadily advancing towards areas previously abandoned to the desert. Much of this desolate Tati is likely to be recovered from the desert at no distant time. Dr. Stein was impressed by the considerable extension of cultivated ground during the last six years. Large areas which lay waste or were covered by drift sand in 1900-1901 have again been brought under cultivation. The great advance in prosperity, which is now taking place in the western oasis of Chinese Turkestan seems to have in Khotan a specially-marked effect on the cultivated area and the numbers of the population occupying it.

East of the Khotan oasis, at the site of Khadalik, which had furnished manuscripts of interest, Stein cleared the remains of the original structure, and recovered a large number of manuscripts on paper in Sanskrit, Chinese, and in the "unknown" language of old Khōtan, besides many wooden tablets inscribed in the same language and some in Tibetan. He found large rolls of a Buddhistic text in Chinese, having on the reverse what evidently is its translation into the language of old Khotan. These rolls may supply the long-desired clue for the decipherment of that language.

Dr. Stein was about to start for his next goal eastward—the ancient site in the desert beyond Niya.

PRIMITIVE CULTURE IN JAPAN.—Mr. N. Gordon Munro, of Edinburgh University, has written a monograph with this title, which is printed in the *Transactions of the Asiatic Society of Japan* (Dec., 1906). It is an extended study of Japanese neolithic culture. Prehistoric archæology has revealed the existence of two distinct cultures in Japan, together with traces of a third. One culture is represented by numerous relics imbedded in the soil or in shell heaps. This is the primitive culture attested by the existence of about 4,000 ascertained sites of residence or refuse heaps. These are characterised by the total absence of metal and by the presence of

polished, finely-chipped and roughly-hewn weapons and implements of stone, as well as of natural stones which have been applied to various uses. Pottery is nearly always found, is usually of coarse texture, and is never turned on the wheel. The remains of the second culture are found in chambers and caves specially built or excavated. It perhaps made its appearance less than 3,000 years ago, when metal had chiefly supplanted stone in the manufacture of weapons and implements. Broadly speaking, the culture remains of the north of Japan are of a more advanced type than those of the south. The monograph is copiously illustrated with specimens of the early arts, and a map shows the distribution of the Stone-age sites and their elevation above sea-level.

Mr. Munro is a skilled archæologist, and the work he has done in Japan is significant. After many years of excavation and research, he finds two great areas of prehistoric activity—the Yamato and the Ainu. The former occupied the region west of Lake Biwa in the narrowest part of the main island; the Ainu (now known to speak an Aryan language) occupied the east and north. Mr. Munro sums up his conclusions thus:

The Yamato leaders, if we may judge by the terra-cotta figures which have been left, were not pure Mongolians. Many of these figures exhibit a distinctly Caucasian appearance, and the aristocratic type of Japanese preserves these features to this day. The *beau idéal* of the artists and poets of Japan indicates a prototype of Iranian or other Semitic affinity. . . . The Mongolian element in Japan was an imported, and not an original stock.

JAPANESE DEVELOPMENT OF SOUTH SAGHALIEN.—The Japanese are actively engaged in the work of developing the southern half of Saghalien, which they acquired from Russia by the Portsmouth Treaty. A railroad, thirty miles in length, was opened in December between the port of Korsakovsk and Vladimirovka. It has six stations. Nearly all settlements in the Japanese territory are now connected by telegraph. A Colonial Department for administering Karafuto, the Japanese name for their part of Saghalien, Hokkaido, and Formosa, is to be formed in the Ministry.

CHINESE INFLUENCE IN SIAM.—In his monograph "Le Siam" (Fascicule V of the *Travaux* of the Séminaire de Géographie de l'Université de Liège), Mr. Ernest Robert says that the Chinese influence in Siam is becoming more and more pronounced. The Chinese are especially active in commerce, navigation, and finance, and form in Siam, as in Java, the richest class. Chinese of unmixed blood are comparatively few in number. They come to Siam unmarried, take wives from the native women, and link all their interests with the home of their adoption. Thus Siam is becoming more and more Chinese. The children of these mixed marriages, the "Lukchin," have the best qualities of both races—the vigour, initiative, and energy of the Chinese united with the gentleness and amiability of the Siamese. In the course of a few generations this new type of manhood will be widely spread over Siam. The comparatively weak and apathetic Siamese will have in their blood some of the moral force of their neighbour. In Mr. Robert's opinion, this gradual fusion of the two peoples will, in the present century, have a most beneficial effect upon the Siamese nation.

EUROPE.

ANNALS OF TROPICAL MEDICINE AND PARASITOLOGY.—The Committee of the Liverpool School of Tropical Medicine has issued the first number of a handsome publication with this name, which will replace the series of separate "Memoirs,"

21 of which have hitherto been published by the School. The Annals will contain accounts of the various expeditions of the School and of the scientific work done in its laboratories at the University of Liverpool and at Runcorn. Original articles from the outside, on subjects connected with tropical medicine or hygiene, may also be published, so that probably not less than four numbers of the Annals will be issued annually. The subscription price is 10s. 6d. a year. This handsome publication will be welcomed by all who are interested in the development of the tropical regions. The School which issues it is recognized as one of the foremost agencies in the study of tropical diseases and hygiene.

INFORMATION CONCERNING THE GERMAN COLONIES.—The *Kolonial Handels-Adressbuch*, 1907, contains over 200 pages of compact information about the German colonies. This includes the names and addresses of colonial merchants, of societies which are promoting agricultural or other phases of development, lists of colonial officials, freight rates, details of commerce, and a large variety of other facts. If we desire facts relating to the Shantung Railroad, for example, we learn that the company offices are in Berlin, that the line connects the port of Tsingtau with Tsi-nan, its length is 436.4 kilometers, it was opened on June 1, 1904, and there are fifty-two stations on the main line. The distances between the stations and the starting-point, the number of passenger and freight trains, the passenger and freight charges, and the cost of freightage by ox waggon, or porter, from various points of the line are given. In the fulness and excellent arrangement of its contents this Annual is a model for similar publications.

OCEANIA.

PHOSPHATE BEDS ON OCEAN ISLAND.—Ocean Island, also called Paanopa, is in the South Pacific between the Gilbert and Solomon groups—in $0^{\circ} 52' \text{ S. Lat.}$ and $169^{\circ} 35' \text{ E. Long.}$ It was annexed to the British Empire in 1900, and is under the jurisdiction of the Administrator of the Gilbert and Ellice Protectorates. It has had no regular connection with the outer world, but was sometimes visited by a small cruiser.

It has now become known through its remarkably rich phosphate beds, which are being mined. As many as six steamers may be seen at once at anchor near this once quiet island and taking in cargoes of the rock.

The phosphate of Paanopa greatly resembles thick coral. It is whitish in colour, very hard, and has every appearance of having been deposited by sedimentation. At first glance the rock would not appear to have commercial value, but the loading of the ships is the best proof to the contrary. The phosphate is treated with sulphuric acid, which changes it to superphosphate, thus increasing its solubility and making its fertilizing qualities fully available. The present markets are Australia, New Zealand, Japan, and Borneo. The English cruiser *Torch* recently took specimens of the phosphate to Suva (Fiji Islands), where they were exhibited at an agricultural fair. There are in the Fiji group a number of small, uninhabited islets which have a formation that, at least, looks like that of the phosphate rock of Paanopa and the discovery of beds would not be especially surprising, as these little islands have not been explored, and Fiji in its "soapstone" is known to have a substance that resembles the Ocean Island phosphate.

This information is taken from the *Mitteilungen* of the K. K. Geog. Gesellsch. Vienna, Vol. 50, No. 1. Ocean Island is mapped in Stieler. No mention of it is made in Reclus's volume on Oceania, nor does its name appear in the Statesman's

Year Book. Vivien de Saint-Martin's Dictionnaire says that the island is circular in form, has twelve or more miles of coast-line, with an area of about ten square miles, and that it is well wooded and a mountain rises in its centre.

VARIOUS.

SEISMOLOGICAL COMMITTEE.—At the New York meeting of the American Association a standing committee in the sections of Geology and Physics was appointed as a Seismological Committee. The members are G. K. Gilbert, Cleveland Abbe, C. E. Dutton, Otto Klotz, L. A. Bauer, John F. Hayford, W. W. Campbell, A. C. Lawson, H. F. Reid, Ralph S. Tarr, C. G. Rockwood, Jr., W. J. McGee, William H. Hobbs, L. M. Hoskins, and T. A. Jaggar. The *American Journal of Science* says it is desirable to have such a committee available for counsel in connection with legislation providing for the investigation of earthquakes, to guard against unnecessary duplication of studies, to spread information regarding construction suited to earthquake districts, to collect data concerning light and heavy shocks, and to start investigations upon large problems of seismology.

YEARBOOK OF THE CARNEGIE INSTITUTION.—Yearbook No. 5 for 1906 has just appeared. The anthropological work during the past year included the researches of Mr. William Jones of the American Museum of Natural History among the Ojibwa, and especially the translation of a mass of native texts previously obtained. The results of the investigation will soon be ready for publication. The paper will contain myth, tradition, an account of the leading religious ceremonies, and a discussion of the elements at the basis of Ojibwa religious belief. Mr. George A. Dorsey, of the Field Museum of Natural History, of Chicago, continued his investigation among the tribes of the Caddoan stock and submitted the manuscript of the last volume bearing on the mythology of the tribes. The greater part of the year was spent in preparing a manuscript account of the Society and the religion of the Skidi Pawnee. Practically all of the rituals now known have been obtained.

In geology, Dr. T. C. Chamberlin's work embraced some special studies on the former rates of rotation of the earth, on the reversal of deep-sea circulation, and on the fourfold organization of typical atmospheres.

MANUAL OF TOPOGRAPHIC METHODS.—This useful monograph by Mr. Henry Gannett, which was first published in 1893, has just been republished as *Bulletin* No. 307 of the U. S. Geological Survey. It describes the topographic work, instruments, and methods of the U. S. Geological Survey, primarily for the information of the men engaged in this work. On the three scales adopted for the topographic survey sheets the map of the United States, excluding Alaska, will cost about \$25,000,000, and at the present rate of progress will require fifty years for its completion. The Twenty-seventh *Report* of the Geological Survey says that the total area covered by the topographic surveys in the United States to the middle of 1906 is 992,601 square miles, or about 32 per cent. of the whole area of the country.

THE MOTION OF GLACIERS.—The cause for the motion of glaciers has received much attention, and numerous theories have been proposed. For some time there has been a tendency toward the abandonment of the theory of viscosity, and this tendency has in America received quite an impetus from the publications of Professor Chamberlin. Recently, however, the argument against viscosity has been challenged with vigour by Mr. Osmun Willcox in a privately printed paper on "The Viscous *vs.* The Granular Theory of Glacial Motion," published at Long Branch, N. J.,

1906. Dr. Willcox considers one by one the arguments which have been advanced against the viscosity theory, and disposes of them with great effectiveness. He shows that the "assumption that crystalline character is incompatible with viscous fluidity" is "without force, in view of the existence of crystalline liquids." He further shows that glacial phenomena are rendered intelligible by the use of the term *fluid* in its mechanical sense. Dealing with the question, as he does, from a knowledge of organic chemistry, Dr. Willcox is able to handle the subject from a standpoint which is not commonly possible for the geologist. After establishing the postulate that a crystalline substance is capable of viscosity, he considers the actual behaviour of ice, and shows clearly not only that it has all the characteristics of viscosity, but that, as a viscous body, it is capable of performing the work with which it is commonly credited. Much attention is then given to the question whether the same can be held to be true of the Granular Theory. Against this he marshals a large body of fact and leaves it in the most unstable position. He points out that the advocates of the granular theory of glacial motion have ignored a vital point—namely, "the relation between the rates of accumulation and dispersal of free energy within a glacier." He furthermore clearly shows that if the conditions postulated by the aid of that theory actually prevailed in nature, "the forward advance of a glacier would be incredibly limited." Dr. Willcox's discussion of the subject is admirable for its convincing character; and it seems quite certain that he has definitely established the theory of viscosity by overthrowing the arguments which have been raised against it.

R. S. T.

The *Monthly Bulletin* of the International Bureau of American Republics (Feb., 1907) says that Dr. William R. Shepherd, Professor of History in Columbia University, will visit the leading South American cities this year, as the representative of the University, to meet leading citizens, with a view of acquainting them with the educational resources and opportunities of American colleges and universities. This is in accordance with the new programme of the Bureau to develop closer relations with Latin America on the intellectual and educational as well as on the commercial side.

MR. ELLSWORTH HUNTINGTON has been appointed instructor in geography at Yale University.

A REGULAR MEETING OF THE AMERICAN GEOGRAPHICAL SOCIETY was held at Mendelssohn Hall, No. 119 West Fortieth Street, Tuesday, February 26, 1907, at 8.30 o'clock, P. M.

Vice-President Tiffany in the chair.

The following persons, recommended by the Council, were elected Fellows:

Richard S. Mercer.

Theodore Wentz.

Rudolph Kleybolte.

Dr. E. S. Robinson.

The Chairman then introduced Dr. Frederick A. Cook, who addressed the Society on the Conquest of Mt. McKinley.

Stereopticon views were shown.

On motion, the Society adjourned.

NEW MAPS.

AFRICA.

EGYPT.—Egypt. Scale, 1:50,000, or 0.7 statute mile to an inch. Sheets: XIX-VI & VII S. E.; XXI-VIII S. E. Survey Department, Cairo, 1906.

The first of these sheets gives the topography of a small area in the desert, east of the Nile and northwest of the Wadi Kenah. The second sheet shows a cultivated region, chiefly on the east bank of the Nile, with irrigation canals, etc., for twelve geographical miles south of the 26th parallel, N. Lat.

SIERRA LEONE.—Sierra Leone. Scale, 1:250,000, or 3.95 statute miles to an inch. Sheets, 58-L, 58-P, 59-I, 59-M, 70-D, 71-A. Compiled in the Topographical Section General Staff. Agent for sale, Edward Stanford, London, 1907. (Price, 1s. 6d. a sheet.)

This is the best working map of Sierra Leone yet produced. The exploration of that colony has advanced so far that a great number of facts can be given about it on maps of a sufficiently large scale. Still, no parts of the country have been surveyed except the frontiers by Boundary Commissions, and the neighbourhood of Freetown. The positions of the rivers, roads, and villages on most of this six-sheet map are, therefore, only approximate. An enormous amount of data is given, including such detail as paths that are fit for hammocks and the position of the boundary-stones along the frontiers. Practically all of the information is sufficiently exact for present business and administrative purposes. The line of the new railroad, which extends from Freetown over 200 miles into the interior, is given.

UGANDA.—The Peaks, Passes, and Glaciers of Ruwenzori. Scale, 1:50,000, or 0.7 statute mile to an inch. By the Duke of the Abruzzi. *Geographical Journal*, Feb., 1907, London.

Illustrates the paper on his Ruwenzori explorations read before the Royal Geographical Society by the Duke of the Abruzzi. The sketch map does not show the entire range, but only the several snowy groups constituting the culminating portion of the range, together with its passes and valleys. The Duke said in his paper: "This map is based on observations carried out often under unfavourable atmospheric conditions and not always with instruments of great precision; but having regard to the number of observations on which it is based, I believe it will be found approximately correct."

UGANDA.—Uganda (Provisional). Scale, 1:250,000, or 3.95 statute miles to an inch. Sheets, 86-A, 86-E, 86-I, 86-M, 86-N. Compiled in the Topographical Section General Staff. Agent for sale, Edward Stanford, London, 1907. (Price, 1s. 6d. a sheet.)

Black-and-white maps indicating on a comparatively large scale the main topographical features, drainage systems, swamps, roads, native and other settlements, etc. On some sheets large areas have not been explored and are left white. Other sheets are well filled with detail. The scale is large enough to give—for example, at the town of Mengo, the residence of the young king, the positions of the bishop's palace, the cathedral, Mtesa's tomb, the mission stations,

etc. These sheets are serviceable to students of the parts of Africa which they cover; and as they embrace a wide range of the geographical information thus far obtained, they are convenient helps in further work.

AMERICA.

U. S. GEOLOGICAL SURVEY MAP.

UNITED STATES.—Crest Lines of Niagara Falls. Scale, 325 feet to an inch. Compiled by W. Carvel Hall. *Bull.* No. 306, 1907.

This sheet gives the crest lines of Niagara Falls as determined by surveys made in 1842, 1875, 1886, 1890, and 1905.

U. S. HYDROGRAPHIC OFFICE CHARTS.

Pilot Chart of the North Atlantic Ocean, March, 1907.

UNITED STATES.—San Francisco and Vicinity. Showing the Course of the Great Fault from Point Arena to Chittenden. *Bulletin* of the Imperial Earthquake Investigation Committee, Vol. No. 1, Tokyo, 1907.

Shows in red the line of the old weak zone constituting a fault whose redislocation on April 18th last caused the San Francisco earthquake. The length of the visible fault is over 150 miles, being three times that of the fault line in the great Japan earthquake of 1891. An accompanying figure shows the direction of motion at different places on or near the fault.

UNITED STATES.—Floral Areas of the State of Washington. Compiled on Base Map of U. S. General Land Office, by Charles V. Piper. Scale, 1:760,320, or 12 statute miles to an inch. Contributions from the National Herbarium, Vol. XI. Smithsonian Institution, Washington, 1906.

Six tints are used to show the distribution of flora in the State according to its origin as Arctic, Canadian, Humid or Arid transition, etc. The Arctic flora is seen on many of the mountains.

UNITED STATES.—General Chart of Alaska. To accompany Reindeer Report by Dr. Sheldon Jackson for 1905. Washington, 1906.

On the post-route map of Alaska are imposed in red the positions of the public schools and reindeer stations throughout Alaska.

UNITED STATES.—Karte von Alaska. Scale, 1:5,000,000, or 78.9 statute miles to an inch. *Petermanns Mitteilungen*. Vol. 53, No. 1, Justus Perthes, Gotha, 1907.

This map is based upon the Geological Survey Map compiled by E. C. Barnard, which accompanies "The Geography and Geology of Alaska," by Mr. Alfred H. Brooks, published by the U. S. Geological Survey as Professional Paper, No. 45. It is a splendid generalization of the information on this map, which is the fullest cartographic expression published of the results of our Government surveys and of other studies and discoveries up to the time it was issued. The German map indicates the areas from sea-level to 300 meters in light green, mountain features in brown, with many heights in meters, hydrography in blue, and the gold fields of Alaska and neighbouring parts of Canada in yellow. Post, telegraph, and missionary stations, telegraph lines, coal mines, etc., are shown. Three insets of Alaska show the wooded areas, the regions whose elevation is above the tree limit, tundra, glaciers, and snow fields, the geological

formations, etc. Many areas are white, showing the large amount of exploration yet to be done. This is the best map of Alaska for general purposes that has yet been produced.

EUROPE.

GERMANY.—Gegend von Magdeburg. Scale, 1:300,000, or 4.7 statute miles to an inch. *Abhandlungen und Berichte* Vol. 1, No. 1 of the Museum für Natur und Heimatkunde zu Magdeburg, 1905.

Illustrates a paper by T. Jacob: "Die geographisch bedingten wirtschaftlichen Grundlagen der Magdeburger Gegend." The surface forms are shown by brown tints and the areas of coal beds and salt fields are indicated.

NORWAY.—Topografisk Kart over Kongeriget Norge. Scale, 1:100,000, or 1.5 statute mile to an inch. By the Norwegian Geographical Institute, Christiania. (Price, kr. 0.60 a sheet.) Sheets: Gausdal, 31 B; Sarpsborg, 10 C; Lillehammer, 25 D; Nordre Faemund, 38 D; Trondhjem, 46 D; Steigen, K 11; Kjerringö, K 12; Bodö, K 13; Ofoten, M 9; Hjelmsö, V 1; Noarvas, V 8; Njullas, V 9; Hugstfjeld (Caskemvarre), W 8; Vestertana, Y 3; Baasfjord, AE 3.

Thirteen of these sheets are new sheets of the Topographical Survey of Norway and two are revisions of earlier sheets. The work on the topographic map has been in progress for about thirty-one years and the new sheets above enumerated have been added in the past two years. The progress of this great work of topographical map-making is necessarily slow, as the surveys are difficult and expensive in a land so crowded with mountains. Most of the present sheets are in the fiord regions, and the maps will be invaluable in the study of this area of remarkable fiord development. The cartographic treatment is of the first order. Hill features are shown chiefly by contours with 100-foot interval. Standing waters are in blue, rivers in black, glaciers in green, and forests and important tilled areas are indicated.

NORWAY.—Generalkart over det sydlige Norge i 18 Blade. Scale, 1:400,000, or 6.3 statute miles to an inch. By the Norwegian Geographical Institute, Christiania, 1906. (Price, kr. 0.60 a sheet.)

Topography is shown in wash colour. Longitudes are referred both to the Christiania and the Paris meridians.

SIAM.—Carte du Siam. Scale, 1:6,000,000, or 94.6 statute miles to an inch. Par E. Robert. From "Le Siam," Fascicule V, of the Travaux du Séminaire de Géographie de l'Université de Liège, 1906.

Shows in red the boundaries of Siam according to the treaty with France in 1904. Railroads in operation and projected are indicated, and hydrography is in blue.

SIBERIA.—Map Showing the Distribution of the Tungus Tribes in Siberia. Scale, 1:12,000,000, or 189.3 statute miles to an inch. *Memoirs of the Imperial Russian Geographical Society, Ethnographical Section*, Vol. XXXI, Part II, St. Petersburg, 1906. (In Russian.)

Accompanies an article on the Tungus of Siberia by S. Patkanov. The Tungus extend from the Ochotsk Sea almost to the Yenisei River and from near the Arctic Ocean to the Amur River. The large regions, where they form from 75 to 100 per cent. of the population, are shown in red; a lighter tint shows the small regions, where they constitute from 5 to 75 per cent. of the population.

BOOK NOTICES.

Neu-Mecklenburg (Bismarck-Archipel). Die Küste von Umuddu bis Kap St. Georg. Forschungsergebnisse bei den Vermessungsfahrten von S. M. S. Möwe im Jahre 1904. Von Dr. Emil Stephan und Dr. Fritz Graebner. Berlin, 1907, Dietrich Reimer (Ernst Vohsen). Pages xii and 242, with chart, 10 plates, 133 text illustrations, and 3 pages of music.

Südseekunst. Beiträge zur Kunst des Bismarck-Archipels und zur Urgeschichte der Kunst überhaupt. Von Dr. Emil Stephan. Berlin, 1907, Dietrich Reimer (Ernst Vohsen). Pages xvi and 145, with 13 plates, 2 sketch maps, and 103 text illustrations.

Geographers who since 1885 have had to carry in the mind the double nomenclature of the Bismarck Archipelago, that which it received by right of discovery and that which was forced upon it by official bureaucracy, will enjoy a sense of satisfaction in finding that any German, particularly one in official station (Dr. Stephan is a surgeon in the German navy), acknowledges that Neu-Mecklenburg might far better retain its historic name of New Ireland. The reason which he assigns is an amusing one. It would better have served to indicate, he says, the historic development, if the fact were prominently presented, that in this case the young colonial power had ousted the sea-queen Albion, that it had laid hands upon the discoveries of a Dampier and a Carteret. For Germans, he continues, there is no glory in the possession of a Neu-Pommern and a Neu-Mecklenburg; in the possession of a New Britain and a New Ireland there would have been glory.

For the former of these two volumes, with which alone the present notice will concern itself, there can be nothing but praise in the broader aspect of treatment, and for the more intimate detail of the conclusions to which the authors are led there must be careful consideration, even though in some particulars we are not quite able to lend ready accession. The present writer must acknowledge a lively interest in, rather than claim an extensive familiarity with, the region so thoroughly covered in Dr. Stephan's work, for when he made two reconnaissances along the same coast the labor trade was at its infamous height, now more than a score of years ago. The shore was deserted and such population as still cowered in the mountain recesses naturally avoided any ship in the offing.

In its larger scope, the method of the work of Dr. Stephan and his learned collaborator, Dr. Graebner, of the Museum für Völkerkunde at Berlin, may well serve as a model for reports of this class. It combines the detailed precision of a well-kept field-book with the orderly treatment of a monograph.

So far as concerns the former aspect of the work, it is to say that Dr. Stephan has confined himself rigidly to the territory which came under his own notice while serving on the survey ship *Möwe*. This region lay upon the westerly, or St. George's Channel, side of New Ireland from $3^{\circ}50'$ s. to $4^{\circ}51'$ s., one degree and one mile, and beyond this limit of his personal exploration the author has had the scientific courage to refrain from passing. Within this limit it is difficult to believe that anything can have escaped his diligent perquisition or have failed to attract his curious investigation. To what extent he examined all things we may judge from his census or directory of the towns upon the coast. For each house he gives a concise description of its building, the pagan and the Christian names of the householder, of his wives and of his children, notes the possession or lack of

cook-house, hen-house and pigsty, together with the class of his canoe, the number of his arable fields, cocoanut trees, swine, hens and dogs, and in the latter case gives the names of each, together with such other remarks as may serve to sum a very complete picture of the family.

Now, we may not need to use this intimate information from the coast of New Ireland, but it does leave us with the feeling that the information in other parts of the volume must be minute and accurate in the same degree, and that is an impression which it simplifies things very much to have. It may be said that Dr. Stephan's observations on the people correspond very closely with those of the writer, based upon acquaintance with undoubtedly cognate stock in Mioko and the Gazelle Peninsula; yet we cannot agree with his conclusion that physically they show a Polynesian admixture. It is interesting to find that his all too brief vocabularies avail to confirm in many particulars a vocabulary from New Ireland, region or tribe not specified, which was published by Duffield in the first volume of the Proceedings of the Royal Society of Queensland; owing to the collector's declared preconception of an Egyptian origin for these Melanesians, we were inclined to doubt the worth of that vocabulary.

With such a mass of carefully detailed notes one must admire the generous devotion of Dr. Stephan in sharing the credit for the development of the broad results of the work. To himself he reserved the discussion of the art sense in the people of his study, forming the second of these volumes. For the rest he enlisted the trained acumen of Dr. Graebner, to whom is largely due the presentation of the ethnological results. Nor was the sharing of the credit confined to this great act of unselfish zeal for accuracy. Within the work are special subjects worked out by masters of the respective subjects. Thus we find a chapter on boat construction and seamanship elaborated by Oberleutnant-zur-See Klüpfel, and the article on the music of the New Irish is from the research of Prof. Erich M. von Hornbostel, of the Psychological Institute of the University of Berlin. One thing only do we miss from this work—that is to say, there is almost a complete absence of treatment of the legendary history of the peoples who passed under Dr. Stephan's observation. He recognizes this lack and offers an explanation which will evoke the sympathy of such as have found themselves similarly situated. He was imperfectly acquainted with the speech of any of these people, and within the sixty miles of his examination the differences are so great as to present an insuperable obstacle, and his only means of communication was the pidjin of the Western Pacific, the *beach-la-mar* tongue. This is a most amusing jargon, one which remarkably facilitates ready communication of simpler needs, but we know from serio-comic experience that it does not lend itself at all to investigation of tradition and cosmopoetic myth. Furthermore, even had the linguistic difficulty not existed, such material is by these islanders regarded as esoteric, and could only be acquired by a white man after confidence had been fully established and relations of sympathy entered upon. We must hope that, with the spread of German interest in their South Sea empire, skilled observers will engage upon the by no means hopeless task of ingratiating themselves with these savages and putting on record the recollections of the past, for our inner knowledge of the Melanesian tract is sadly to seek.

We note that our author, in expressing his thanks to those who have facilitated his work, mentions cordially his publisher—a relation that one is apt to neglect. Those who are familiar with the recent stage of the house of Dietrich Reimer well know what a zealous student in geography Mr. Vohsen has shown himself to be.

W. C.

Bericht über die neuere Literatur zur deutschen Landeskunde. (Bd. III, 1902 und 1903). Von Prof. Dr. Alfred Kirchhoff und Prof. Dr. Willi Ule. v and 250 pp., Ferdinand Hirt, Breslau, 1906. (Price, M. 7.50.)

Bibliographies of German geographical literature and map products are of especial value to geographers, because Germany has still so much to teach the rest of the world as to the content of geography and the methods of using geographical data in books and maps. For these reasons the third volume of this report on German geographical literature in 1902-1903 will be as heartily welcomed as the earlier volumes. The contents are so classified that every literary and cartographic reference is easily found. Under nearly all the titles are a few lines of descriptive or critical matter.

Aimé Bonpland, Médecin et Naturaliste, Explorateur de l'Amérique du Sud, Sa Vie, Son Œuvre, Sa Correspondance, avec un choix de pièces relatives à sa Biographie, un Portrait et une Carte. Par le Dr. E. T. Hamy, Membre de l'Institut, etc. E. Guilmoto, Paris, 1906.

To follow up the publication of the correspondence of Alexander von Humboldt with the letters written by Humboldt's life-long friend was a happy thought of the President of the Society of Americanists, and it is executed by him in his characteristic commendable manner. The correspondence of Bonpland fills a gap in biography which the writings of de Angelis, de Moussy, and the work of Brunel had left open. In fact, a biography of Bonpland, or any material therefor, is a welcome addition to that of Humboldt also, so intimately are the lives of these two men linked, although they took leave of each other in 1816 for the rest of their lives, though neither in spirit nor in feeling was their mutual attachment ever impaired; it rather seemed to grow with age. Humboldt was born in 1769, Bonpland saw the light of the world, at La Rochelle, four years later (August 28, 1773). They met accidentally, at Paris, in a doorway; Bonpland was carrying botanical apparatus, Humboldt noticed it, and the connection was made, for the benefit of science and humanity.

Bonpland was educated for the practice of medicine, and as a naval surgeon began his career at Rochefort and Toulon. Upon his return to Paris he entered definitely upon the course of studies that was to fit him more particularly for explorations and researches in distant, unstudied lands. The outcome of his labours in botany is a household word to scientists, but he was not less informed on zoological (fossil and living) and geological topics. In every way a worthy associate of Humboldt, he exercised a healthy influence upon the work of the great physicist. The two men complemented each other, in knowledge and in the methods of advancing and applying it. It is perhaps regrettable that Bonpland did not remain longer in Europe, after his return with Humboldt in 1804. He had been very well received, and shared, in fact, all the scientific honours bestowed upon his illustrious companion. The Imperial Government of France assigned to him, in compensation of a part of his botanical collections, an annual pension of 3,000 francs. How that sum, comparatively small at the present day, was appreciated by the beneficiary can be gathered from his letter of March 18, 1805, to the husband of his sister: "Felicitate me, I am protected from frost, northerly winds, rains, &c., finally, from all the little causes that often make the land-tiller fear for his crops." Besides, he counts upon a gain of

about 50,000 francs from the publication of the works on the explorations, as Humboldt had voluntarily yielded one-half of the proceeds to his companion, and the whole proceeds of the botanical section. In the year 1808 the Empress Josephine made Bonpland Intendant of her country abode of Malmaison, with 6,000 francs of appointments. For five years and a half he administered and directed the gardens of that admirable domain; it is needless to state that he made of them the horticultural centre whence rare and beautiful plants radiated over France into the gardens of plant-lovers as well as of industrial florists. It was at the end of this period that he married a woman twenty years younger than himself. The union was not happy.

Notwithstanding the favourable situation in which the great botanist found himself in Europe, his restless temperament led him soon to look out for new fields of action. Bonpland was, in reality, a visionary, a generous optimist. He determined upon returning to South America and improving there what he had seen in Europe (especially in England) of the industrial applications of the vegetable kingdom. Humboldt, knowing the temper of his impulsive friend, felt that it would be vain to attempt to change his determination. In November, 1816, Bonpland sailed for Buenos Ayres, accompanied by his wife and her daughter of a first marriage.

Like most travellers and explorers, Bonpland left Europe with the expectation of returning, and of enjoying there, quietly, the fruits of a semi-scientific, semi-industrial, activity in South America, from which he confidently expected great material profits. The enterprise met with drawbacks; still, it would probably have been no disappointment but for one of the most inexplicable acts ever committed by an American ruler. We refer to the invasion of Argentine soil by Indian soldiers from Paraguay, sent by Francia, the epileptic despot, to sack and ruin the establishment of Bonpland and carry him a prisoner to Paraguay. It is doing almost too much honour to the memory of the contemptible tyrant to mention the deed. What were the motives is yet hardly known, and on the capture of Bonpland and his ten years of criminal detention on Paraguayan soil Mr. Hamy gives comparatively few details. The subject is manifestly a painful one to him, as it is to all of us. Liberated in the beginning of 1831, Bonpland spent the remainder of his life in the Argentine, in which republic he died in March, 1858, a few months before Humboldt. More than sixty years of uninterrupted friendship united these two great men. Only the captivity of Bonpland in Paraguay caused a break in a correspondence which would, otherwise, have been carried on continuously for forty-two years. The ten years of sequestration by Francia gave Humboldt occasion to exert and strain all the influences he could command in behalf of his unfortunate friend, but in vain; no European, no American intervention made any impression on Francia.

The interest which Dr. Hamy has known how to impart to his biographic sketch makes one deplore that it is so short. Many of the pieces of correspondence might have been spared with advantage and their contents told by Dr. Hamy himself. The letters are largely of a more intimate character than the letters of Humboldt published by Dr. Hamy, and naturally so, since this is the only collection of Bonpland's so far given to the public. It is interesting to compare the letters relating to the great South American journey with those of Humboldt on the same subject. There is much resemblance in tone as well as in spirit.

After his liberation from Paraguayan captivity, Bonpland, who had lost

everything and was then fifty-eight years of age, went to work at once to retrieve his losses. He succeeded in part, and this enabled him to close his days, if not in comparative ease, at least with freedom from immediate and pressing cares. He preserved his vitality to within a year or two of his death, the last description of his appearance being from the pen of Avé-Lallemant, when Bonpland was near the end. His wife had left him soon after their arrival at Buenos Ayres; three children of a later union cared for the last days of the scientist. The picture of his home is not attractive, but it must be remembered that, under the tropics, comfort is attained more easily than in northern climes.

A. F. B.

Un Crépuscule d'Islam. Maroc. Par André Chevrillon. Librairie Hachette et Cie. Paris, 1906.

It is rarely that a book is found where the title so well fits the subject and the style is so well suited to the title. Morocco, and chiefly its capital Fez, is the subject, and here the remnants of Moorish culture, as we are told it was once in Spain under the domination of the Arabs, seem to have found their last ditch. But it is really a *crépuscule*, and Mr. Chevrillon has well depicted it. Reading his descriptions of the old Moorish city, with its absolutely typical local colour, one feels tempted to close the eyes and to fancy Toledo, Cordova, not at the period of their glory, but when decline, material and mental, had set in.

Mr. Chevrillon writes a beautiful French. His language is always dignified and, above all, highly poetic. He floats, so to say, constantly on the same plane, higher than the majority of writers that handle such topics. There are no abrupt ups and downs in his style, none of those sudden plunges to the vulgar, or at least the trivial, that make one deplore noble pages marred by such concessions to popularity. Like a soft rippling surface of limpid water his words and phrases undulate almost imperceptibly along. The reader feels the soothing effect; he becomes dreamy, and finally drowsy. It is the atmosphere of a slumbering part of Africa, resting under the shadows of a weird past and the scorching heat of the not very distant desert.

The style, so eminently fitted to the subject, has great attractions, only it is wearisome in the end. One tires of the never interrupted maze of beautiful arabesques of words. One longs for dry and unadorned facts, for sentences terminating in some naked conclusion. Instead of it, one allegory chases the other; we find trouble, not seldom, in unravelling what the author really means. There is a wealth of interesting data, but they are not put clearly. The book is a painting, and not a source of solid information. Hence its value for geography is minimized, and there is little to pick out worthy of special notice. The description of the African shore is as monotonous as that shore itself; the impression is true, but an impression, subjective at that, cannot replace data. Most of the data concerning physiography, natural history, ethnology, are merely hinted at. We feel that the author knows what we would like to learn from him, but in lieu of giving it to us he turns into the channel of comparisons, at first attractive, then wearisome, but always very poetic.

Life at Fez must be rather monotonous, and it is not enticing for the European or the American. The conveniences, even the most modest, to which we are accustomed, must be foregone. Chairs are only displayed on state occasions; when Mr. Chevrillon had his audience of the Sultan that potentate sat on a chair. There is splendour and luxury in the abodes of the rich and mighty, but

it is a magnificence of bygone days and often in decay. Of the commercial life at Fez it can be gathered, that it is that of the Orient in general, carried on in dingy alleys, in vault-like chambers, reached through narrow passages decorated with the name of streets. Filth abounds, and personal safety is fairly assured in the city; outside of it, at a short distance from the walls, which look like an agglomeration of fortresses, one is scarcely safe at home in the daytime and much less so at night. The conglomerate of tribes and stocks forming the so-called rural population, is almost uncontrolled by the authority of the monarch.

A few parties given to the author by high functionaries throw some light on the state of knowledge of the superior classes, through the conversations which he reports as having had with them. Their astronomical ideas, for instance, have remained stagnant since the time they were evicted from Spain. One or the other of their scribes may have more advanced ideas, but the members of the Cabinet, at least, who entertained Mr. Chevrillon had certainly not heard of Copernicus nor of Galileo. They glory in the glory of what their ancestors knew, but feel no desire to increase that knowledge, hardly even to preserve it.

Of the Jewish population of Fez a not very enticing picture is given. Dominated by a council of Rabbis, they are as conservative and retrograde even as the Mussulmans. The Jewish Alliance has attempted to introduce some improvement in their menial condition, but the efforts were ill requited. Still, the Alliance perseveres under the greatest sacrifices. Jewish women are the missionaries who have undertaken the good work. May their sufferings (which the author describes as almost intolerable) be at last rewarded by some success!

Of the interview with the Sultan not much can be said. It was one of the common-place interviews so often recorded. On such occasions, and especially when intercourse is limited to a single meeting, no just impression can be gathered of the personage visited. He seldom takes more than a passing interest in the foreigner presented to him, and Orientals are wily enough not to allow their inner sentiments to pierce the envelope of official dignity and reserve.

The return to the Mediterranean occupies, naturally, much less space than the journey to Fez. We see the same countries and find them, as well as the descriptions, as oriental, dreamy—crepuscular—as in the beginning.

A. F. B.

Charleston—the Place and the People. By Mrs. St. Julien Ravenel.

With Illustrations by Vernon Howe Bailey. The Macmillan Company, New York, 1906.

With the glamorous touch of a writer of romance, and yet with the earnestness of a historian, Mrs. Ravenel has painted a series of vivid word-pictures of Charleston at its hardy birth in the wilderness; later thriving like a lusty infant upon the good sense and energy of Resident Governors and Council; in its robust and prosperous youth fostered by the courage and patriotism of its citizens; until with regretful sadness she draws the curtain over her canvas showing Charleston, in 1865, lying prostrate and bleeding upon the white sands of her broad beaches.

Dowered herself with some of Charleston's proudest names, our author, with a true heredity, has treated her subject *con amore* and produced a very interesting book. In her short preface she disclaims any attempt at writing a continuous history. From its history of two hundred and fifty years she has chosen "such events as shaped the fortunes of men who made the town, and best illustrate the character of the children who lived in it." The modesty of this statement hardly

prepares us for the accurate historical research shown in her pages. The narrative is full of warm local colour. As we read, "the cool breathing of the sea" refreshes the southern heat; the young colony with the open sea in front, lying between the two rivers "upon which many shippes may ride, before the towne at once" stretches before us, uplands and lowlands carpeted with the tender green of the indigo and rice plantations; white columned, colonial mansions close the vista of an avenue of live oaks festooned with ever-undulating gray moss, or, in the midst of their flower-strewn gardens, crown the banks of the Ashley River; while in the air are the song of the negro and the buoyant laughter of a people to whom great trials come as passing shadows on the sunlit highway of life. In this setting the youthful colony works out its destiny. There is a subtle stir in the air like that of the springtime of the plants.

Each day brings its questions and its crises; and splendidly are they met by the men who, whether they come as wealthy planters from the Barbadoes, or as young professional men from the old country, bring with them a love of freedom and a spirit of true democracy side by side with the traditional Englishman's love of his mother land. Often, indeed, this mother proves selfish or negligent, and the colony must fight for its own. Thus it is left for the brave though irascible William Rhett, or the grave and loyal Governor Nicholson, to free the seas of the pirates who would destroy its commerce, and of the Spaniards coming in deadly hate from St. Augustine.

There are also hard words, mayhap leading to blows, between these loyal Carolinians and their overlords, the Proprietors, and even with King George himself, about commercial and political rights involving questions of principle rather than of material injury. And so, in time, there comes the Declaration of Independence, and the Revolutionary War which shows England that her colony has bred men like Marion, Sumter, Moultrie, Pinckney, Gadsden, and Rutledge.

After this war, with the energy of youth and the dignity of assured strength, the city rises again into happiness and prosperity. Into this new life of Charleston, where much stress is laid on the "minor morals of manners," comes Josiah Quincy from cold New England, looking with alien and distrustful eyes upon the jollity of the horse races, the stately three o'clock dinners with rich display of silver and glass, the gay suppers and dances and the beautiful ladies. But to those who know as Mrs. Ravenel does, these merrymakers are true descendants of their colonial ancestors, capable of enduring as well as enjoying; and, when the war clouds burst again, their laughter changes into bright smiles of encouragement and their pleasures are cheerfully abandoned for the stern duties of home or the camp.

Ever treating details of history with a freshness that robs them of their dryness, the author takes us as intimate friends into the cultivated and well-bred society of the South. Seated with her around the glittering dinner table, or over the dainty tea cups, we listen to the flow of amusing anecdote, incidents of family history, and good-natured gossip, with the vivid interest of to-day, scarce realizing that we are guests of more than a hundred years ago.

Though perhaps there is over-much cataloguing of names and laying out of streets, the book, as a whole, fulfills the promise of its title-page with a delightful generosity, contains information of value, and is well worth reading.

H. P. L.

Four Centuries of the Panama Canal. By Willis Fletcher Johnson.

With Maps and Illustrations. New York, Holt & Company, 1906.

A very good and useful book. Besides views of Panama and interesting or

picturesque points in its environs, it contains several maps, reduced copies of old charts (that of Waldseemüller and the one of Juan de la Cosa, hence the oldest—1500 and 1507—are omitted), and modern ones relating to the Isthmus and the Canal. It is the aim of the author to present the earliest ideas and attempts concerning the opening of an interoceanic communication, and he presents them well. Beginning with the conviction harboured by Columbus, possibly till the end of his days, that he had found, not a new continent but the eastern end of Asia, he shows how that idea exercised an indirect influence upon the thought of cutting the Isthmus, a thought fostered by the narrowness and comparative small altitude of the stretch of land connecting North with South America. The credit of first expressing the idea of a canal at Panama appears to be due to Cortés, who, in search after a *natural* opening between the two oceans which had not been found, adverted to the feasibility of an artificial one. Alvaro Saavedra Ceron is said to have prepared plans for the undertaking in 1529, but his death prevented him from laying them before the Emperor. In passing, it may be said that Mr. Johnson attributes perhaps too much importance to the statements of Antonio Galvano in his "*Discoveries of the World*" (Hakluyt Society publications, translation from the Portuguese, London, 1862). Galvano has written a meritorious book, small as it is, but his information is second-hand at best. It would have been well for the author of the work under consideration had he referred to the original Spanish sources, remembering that "*traduttore traditore*," especially in former centuries. Again, he believes too firmly in the supposed earliest voyages of Vespucci. The authenticity of the first two letters of Amerigo is still much doubted, and for good reasons. They may turn out eventually to be genuine, and Vespucci may have made the voyages which he is said to have performed, but as yet the first two documents in the "*Quatuor Navigationes*" of 1504 remain a point of interrogation. This is said without in the least insinuating a fraud by Vespucci himself. His character should be sufficiently vindicated by this time. He may have been as guiltless of a possible fabrication, as he certainly is of any participation in the origin of the name "*America*."

The few pages devoted to the endeavours of Charles V and Philip II to have the feasibility of the canal investigated and work perhaps undertaken are of course seasoned with the threadbare accusations of cruelty and bigotry against the Spaniards and their monarchs, and with ludicrous overestimates of the aboriginal population of the Isthmus. Pascual de Andagoya was Governor of the *Tierra*, not the *Costa*, *Firme*. The latter name was never in use because it does not exist. In treating Spanish subjects a writer should first become familiar with the Spanish tongue. It is noteworthy, however, that, in 1567, the Nicaragua route was examined by order of Philip II, and unfavourably reported upon. The various attempts to foster the canal idea after the sixteenth and prior to the nineteenth century are commented upon in an interesting manner, and the part played by the English in these endeavours is not incorrectly described. Mr. Johnson is fair towards the various nationalities involved in the canalization project.

The nineteenth century naturally opens with the attention that Humboldt paid to the canal. Through his examination of nine different routes, one beginning so far north as to involve the Mississippi and Missouri rivers, and the most southerly lodging in northwestern Colombia with the Rio Atrato as principal basis, he brought the canal idea into the domain of scientific and practical research. La Condamine had, nearly seventy years previous and together with Ulloa and Juan, glanced superficially at the Isthmus, but the attention of these explorers centred in South, not in Central, America. It may be said parenthetically

that the Kings of Spain never lost sight of the establishment of interoceanic communication, but Spain was too much exhausted to attempt it, and that was still more the case when, after Humboldt had promulgated his views, Spain lost her American colonies and had no longer any interest in an enterprise which was far beyond the scope of her resources. After Humboldt and, as predicted by Goethe, the North-Americans began to interest themselves in the scheme, the canal project grew and finally matured in the course of the nineteenth century, and the story of this growth occupies by far the greatest part of the volume. This may be considered as contemporaneous history, at least in part, and with all its advantages and disadvantages. At all events, it is honest, conscientious work. The writer's judgment upon some of the most disastrous features of attempts at canalization is not offensively harsh. What remains to be done, now that Americans have taken hold of the schemes and failures of other nations, is to avoid the mistakes and crimes of their predecessors and to do better.

Mr. Johnson deals with the English attempts at usurpation in Central America with a certain degree of courteous severity. The buccaneers are frankly called what they were, pirates and destroying angels, as their deeds characterize them. Again, we must gladly acknowledge that through the book there runs a current of fairness toward other peoples and men which is pleasing to notice, and does the author the greatest credit. There are, perhaps, a few exceptions; but no book is without its failings, else it would not be the work of man.* A. F. B.

Observatoire de Zi-ka-wei. Calendrier-Annuaire pour 1907.

Chang-hai, Imprimerie de la Mission Catholique (Paris, E. Guilmoto), 1907. 157 and Appendix of 67 pp.

For the fifth time the zealous Jesuits at the Observatory of Siccawei have issued their annual calendar, which is a most useful handbook to every geographer, and to all persons who take a serious interest in China. Besides the usual parallel Chinese-European calendar and astronomical data for the current year, many interesting topics, like the Chinese calendar and astronomical notions, are discussed, and valuable statistical material regarding the Chinese Empire is embodied in it. The Imperial Telegraph Company possessed, in the middle of 1905, 379 stations; that is, 28 more than in 1904. Forty-two treaty ports were open to foreign commerce in 1906. A summary of the chief events from July, 1905, to June, 1906, is given, and a list of all important meteorological facts for the same period. A special essay is devoted to a study of the climate of Ho-k'iu in Anhui Province. The solar eclipse of Jan. 14, 1907, which was visible all over China, is illustrated in a sketch-map; and nine other sketches, statistical and geographical, are added. At the end, hygienic suggestions and precautions against tuberculosis, issued by the Shanghai Board of Health, are printed in Chinese for the benefit of the Chinese population; and it is remarked that the mortality of the latter in Shanghai has notably lessened since 1902, and fallen

* The following passage disfigures the book:

In the winter of 1874-75 an adventurer named Gorgoza appeared at Bogotá, etc. (*Four Centuries of the Panama Canal*, p. 75.)

The person of whom Mr. Johnson writes without knowledge was Mr. Anthony de Gogorza, who died a few years ago in Paris. He was a man of good family and of unblemished character; no more of an adventurer, to speak plainly, than Mr. Johnson himself. Mr. Gogorza believed that a channel could be opened between the Caribbean and the Pacific by way of the rivers Tuyra, Paya and Cucarica. It does not matter now whether his belief was well or ill founded.

from 31% to 14%; that of the foreign population amounts to 11.2%. Shanghai had in October, 1905, 561,174 inhabitants, of whom 12,326 were foreigners.

B. L.

China's Intercourse with Korea from the XVth Century to 1895.

By William Woodville Rockhill. London, Luzac & Co., 1905. 60 pp.

With two plates.

This paper embodies the welcome republication of two of the author's essays,—one brought out in 1888 in the "Journal of the American Oriental Society" (Vol. XIII), under the title "Korea in its Relations to China," which in this new garment appears carefully revised and substantially enlarged; the other dealing with the laws and customs of Korea, the substance of a portion of which was published in 1891 in the "American Anthropologist." The first investigation is based on Chinese official publications searched through and translated by the author in his endeavour to explain the nature of Korea's relation to China, which prior to 1876, the date of the treaty of Kang-hua between Japan and Korea, was a puzzle to Western nations. They were told, at one and the same time, that Korea, "though a vassal and tributary State of China, was entirely independent as far as her Government, religion, and intercourse with foreign States were concerned,"—a condition of affairs still alluded to by the King of Korea in 1882, in a letter addressed to the President of the United States. The author describes Chinese intercourse with Korea during the Ming dynasty, the Manchu invasion of the country in 1637, the nature of the official relations between the two countries, the reception of a Chinese Ambassador by the King of Korea in 1843, and gives the translation of a Manchu inscription referring to the conquest of Korea. The sketch of Korean customs is still very valuable, especially in indicating those that differ from Chinese. Thus, in some of the Korean laws and modes of procedure, Mr. Rockhill sees an enlightened spirit, not always present among nations that lay claim to a much higher civilization. For example, in cases of murder, the punishment for which is death, the testimony of persons under sixteen years of age cannot be introduced as evidence. An insane person or deaf-mute is not punished with death for murder, but only exiled to a remote locality, while in China a lunatic who murders his father or mother is put to death. Very interesting are the remarks on Buddhism, the Korean form of which presents fewer similarities to that of China, but many striking analogies to Tibetan Lamaism in architecture; painting, exorcising, and prayer formulas (compare Grünwedel, *Buddhist Art in India*, p. 168).

B. L.

The Development of Religion in Japan. By George William Knox.

New York and London, G. P. Putnam's Sons, 1907. xxi and 204 pp.

This volume contains a series of six lectures delivered in 1905-06 at various institutions, on behalf of the American Committee for Lectures on the History of Religions. Mr. Knox, formerly engaged in missionary work in Japan, and later Professor of Philosophy and Ethics in the University of Tokio, now Professor of the History and Philosophy of Religion in Union Theological Seminary, New York, is a well-known and meritorious writer on subjects philosophical and religious connected with Japan. His present book is the fruit of profound research and independent thinking, and presents the most lucid exposition of Japanese religion in its essential characteristics, written in a fluent, agreeable style. The subject is divided into three parts—Shintō treated as natural religion, Buddhism as supernatural religion, and Confucianism as ethical religion and a world system. After all the superficial phrases thoughtlessly repeated

in the current deluge of literature on Japan, this book of Professor Knox comes as a veritable relief, with his clear, sound and quiet judgment, and his avoidance of all commonplace opinions of the day. It is the work of a trained scholar, betraying on every page deliberation, common sense and sane criticism. In a very forcible way, the argument is set forth that the coming into the foreground and the preservation of Shintō are due to a political motive,—the theoretical establishment of the Imperial régime. The Kōjiki, our chief source for the knowledge of Shintō, was a work written with a definite purpose,—the correction of false claims and the establishment of the monarchy,—while in a secondary way we are to be given the origin of the universe itself. There is no pretence to a religious motive, nor of setting forth a moral code, but, in accordance with Chinese precedents, Japan, too, shall have a cosmology, a national history and an account of the way in which the Imperial house obtained its power. It was Chinese philosophy which suggested the notion of an ordered account of the beginnings of heaven and earth, and Chinese history which impelled the collection of the national annals, and Chinese political theory which necessitated a theoretical justification for the Government. It is only in the light of this manifest "tendency," according to Professor Knox, that the meaning of Shintō can be understood. This religion is essentially nature-worship. In the Kōjiki (published A. D. 712) there is no hint of prayer to the ancestors of the emperors, nor of their worship. In the Nihongi, written eight years later, both appear, but only at a late date. The worship of ancestors, then, even of the Imperial family, is not a part of the original religion of Japan. It is through Chinese influence that Shintō is formed and the worship of the spirits of the dead introduced. But this remains strictly subordinate, the ruling idea being the divinity of Japan, and of her representative, the Emperor. There are only a few minor points in which we should dare to dissent from the views of Professor Knox. The deification of the sun in the person of a goddess, and the legends of the Amazon Empress Jingō, cannot be admitted, as he makes out (p. 14), as evidence of a high position for woman in ancient times. Such conceptions are of world-wide occurrence,—stories of heroines, for instance, abounding among the tribes of Siberia and other peoples,—and can prove nothing for the social status of woman among a particular people. All we can infer from the ancient texts, like the cruel isolation of parturient women in a special hut, and the very loose marriage-ties, no more favours the supposition of a superior place for woman in old Japan than among other peoples of an equal standard of culture. The remark on p. 88,—“The boast that in the name of Buddha there has never been shed a drop of blood, is contradicted throughout the history of Japan”—cannot remain uncontested. There is hardly any direct causal connection between the civil wars and internecine strifes and Buddhist dogmatics and controversies. Buddhism surely was not guilty of causing the warlike spirit of Japan.

The volume is provided with a good index, and is fully worthy of the seven other volumes published in this series on the history of religions. It is to be hoped and wished that it will be welcomed by a large audience of readers.

B. L.

Der Unterricht in der Erdkunde auf Grundlage des Landschaftsprinzips. Ein Lehrbuch für Seminaristen und junge Lehrer. Von H. Heinze. Kgl. Seminarlehrer in Friedeberg Nm. Leipzig, Dürsche Buchhandlung, 1904.

The book is intended for the preparation of teachers of geography in

primary and secondary schools. The "Landschaft," or natural division, is made the foundation of the course, and another distinctive feature of the same is the prominent place given in it to home geography, from which not only all geographical instruction must start but whose strengthening and broadening are also expected as a by-product from the treatment of all other stages of the course. The author requires observation, either of the objects themselves or of good reproductions, among which globes and maps occupy a prominent place, to form the basis of all geographical instruction. The pupils must re-discover, as it were, the discoveries of scientific geography which are to become their mental property; in this thinking process the causal connections must stand foremost, so that while the pupil is instructed in regional geography he will incidentally gain a working knowledge of the general geographical laws and principles. A knowledge of the latter thus acquired is considered by the author far superior to one obtained by the systematic treatment of physical geography in the schools. He consents to the latter only at the end of the various chapters of the regional treatment when related and similar phenomena will, by way of reviewing the subjects, be brought together and classified so that the system will be discovered, so to speak, by the pupils themselves instead of being placed before them ready-made in the pages of a textbook. Such teaching requires, of course, an instructor high above the level of a mere interpreter of the textbook, and nothing, perhaps, illustrates better the great difference between the rôle of the teacher in German and American schools than the author's remark that the question whether a textbook ought to be used at all in the elementary school is still an open question. To anybody desiring to inform himself on present tendencies in the teaching of geography in German schools, the book will be an excellent guide. It gives, besides the practical suggestions for classroom work, a complete list of the courses in geography, from the ungraded country school to the "Gymnasium," an extensive list of works of reference, and lists, makers, and prices of geographical "Anschauungsmaterial," including maps and atlases, of Germany and Austria.

M. K. G.

Western Tibet and the British Borderland: The Sacred Country of Hindus and Buddhists. By Chas. A. Sherring. With a chapter by T. G. Longstaff. London, 1906. Edw. Arnold. 8vo. pp. xv, 367, 2 maps, and illustrations.

The sacred country of Kumaon or Bhot, from one to two hundred miles east by south of Simla, is one of the three places where British territory actually touches Tibet without the intervention of semi-independent states like Bhotan, Nepal, and Kashmir. Kumaon is to the Hindu "what Palestine is to the Christian, the place where those whom the Hindu esteems most spent portions of their lives," and hence a place of pilgrimage. A few score miles away to the northeast in western Tibet the sacred lake of Mansarowar and the famous mountain of Kailas, the abode of the gods and the centre of the earth, are still more sacred in the eyes of both Hindus and Buddhists. Thence, as from the Garden of Eden, flow four great rivers—the Brahmaputra, the Indus, the Sutlej, and a branch of the Ganges.

During the summer of 1905, Mr. Sherring, the British Commissioner of Almora, visited both the Indian and Tibetan portions of this Hindu Palestine. He gives us the results of his journey and of a long previous acquaintance with the Himalayas in a large and well-illustrated volume. The book is not always easy to understand, and is so full of repetitions that the reader is occasionally vexed, but nevertheless it is interesting. From the somewhat fragmentary

statements one gathers that we have in the Kumaon region a typical example of the structure of the borders of Tibet. A lofty mountain range, the Himalayas, rises sharply from the low plain of India on the south and descends gently to the inner plateau of Tibet. Since the time when the mountains were uplifted, the swift streams flowing down their outer side toward India have cut headward across the crest of the main ridge into the plateau beyond. Thus the highest mountains are not in line with the passes and the divide at the head of the valleys, but stand from twenty to thirty miles forward as isolated groups of lofty peaks, fragments of what was once a continuous ridge.

Naturally, the people vary in response to physical conditions. On the plain and at the base of the mountains one finds the ordinary Hindus of India, dependent on agriculture; in the mountain valleys the people are Bhotias, dependent in part on agriculture and in part on flocks; and in Tibet the inhabitants of the cold plateau are pastoral nomads. The Bhotias, as might be expected, are a transition type. In race and language they are allied to the Tibetans. Like the latter, they were originally Buddhists; but now the Tibetans have adopted the monastic system of lamaism, and have given themselves over to demon-worship, while the Bhotias have gravitated toward the Hinduism of their neighbours on the south. Many actually call themselves Hindus, although they do not carry out Hindu practices. For instance, women are not secluded, and neither men nor women are compelled to marry as the people of India are, and many people, from choice or because they are unattractive, remain single. On the other hand a vestige of the polyandry of Tibet remains in the custom which makes the wife of a deceased elder brother become the wife of the younger brother. Similarly the funeral customs of the Bhotias are intermediate between those of the Hindus who practise cremation and those of the people of western Tibet who, according to circumstances, practise interment, cremation, the exposure of bodies on hill-tops to be eaten by wild beasts and vultures, and the cutting of the corpse into minute fragments to be thrown into the river. The Bhotias usually cremate the dead, but when death has occurred from small-pox or cholera or other contagious disease the body is thrown into the river or buried. Again, whereas to the Hindu caste is everything, and to the Tibetan nothing, the Bhotias have two castes, an upper and a lower. The two castes will not eat with one another; but even the higher caste eats with Tibetans, not from choice but because the necessities of trade demand it. The Bhotias are great traders, and their position in the defiles of the mountains which separate Tibet and India makes them the natural intermediaries between the two.

North of Kumaon and the home of the Bhotias the Tibetan plateau rises gradually from an elevation of about 14,000 feet near the Himalayas to 16,000 feet a hundred miles away at the gold-fields of Thok Jalung, the highest permanently-inhabited place in the world. In general the topography is mature and the slopes gentle, although certain peaks, such as Gurla Mandhata, 25,350 feet high, tower to great heights. At the northern base of this mountain lie the sacred lakes of Rakas Tal and Mansarowar, three or four miles apart and 14,900 feet above the sea. In 1846 an early explorer found a large stream flowing from Mansarowar to Rakas Tal, and the latter discharging into the Sutlej River. To-day neither body of water has an outlet, the last slight overflow of Mansarowar having taken place in 1894. Around the lakes a large plain, part of which is an old lake-bed, extends far to east and west, and is the home of a nomadic population, dense in view of the mode of life and in comparison with the scanty population elsewhere. In reading Sherring's description of the Tibetan

shepherds one is impressed by their likeness to the Kirghiz, Mohammedan shepherds of wholly different race and religion, who inhabit the similar plateau of Tian Shan, a thousand miles away to the northwest. The dark tents of wool, the dried dung used as fuel, the clothing of sheepskins or of long quilted gowns, the diet of sour milk and meat, the lack of cleanliness, and many other traits seem to be due in both cases to the physical environment which makes pastoral nomadism the only possible form of life. Both races, too, are remarkable for indifference to physical hardship, for hospitality and friendliness, and for cheerfulness. The Tibetan, one would think, has little cause to be cheerful, for he is oppressed right and left by officials; he must buy his tea, cloth, sugar, and other luxuries at exorbitant prices from official merchants; he is constantly in danger of being raided by robbers; and his priestly lamas demand constant contributions in return for warding off demons. It is not strange that Sherring should have found that the population of western Tibet is steadily diminishing. E. H.

Fr. Bartolomé de las Casas. Eine historische Skizze von Prof. Dr. Otto Waltz. Bonn, Martin Hager, 1905.

To the already far too numerous panegyrist of Las Casas, Professor Dr. Otto Waltz of Bonn, Germany, has felt himself constrained to add his name and a so-called historical contribution. Not content, however, with eulogizing the Bishop of Chiapas in the usual way, he puts him forward as a champion of Columbus, as which he appears indeed in the *Historia de las Indias*. The story of the so-called ingratitude displayed towards Columbus has been ventilated, chiefly by Cesáreo Fernández Duro, but of such conscientious and convincing material the author has no knowledge. His documentary material for the sketch before us is quite limited, and of the nature of the Indian, of the real conditions of population in the Antilles, he has, of course, no idea. It is natural, therefore, for him to worship the unpractical zealot, who, while his intentions were laudable, did more harm to the Indian than good. As long as European students fail to understand the times of the Columbian period in America and the inevitable outcome of contact between its peoples and Europeans, as well as the necessity on the part of Spain to resort to experiment in order to deal with the natives, and fail to see that such experiments are always fatal to the weaker party—as long as they do not apply to the history of colonization the ethnologic standard, they will not advance a step beyond the writers of the sixteenth and seventeenth centuries.

The pamphlet of Professor Waltz is not of sufficient importance to warrant an exhaustive discussion. He has gathered some well-known material from well-known literature, and has applied it in a well-worn manner to a most familiar subject. A. F. B.

Spectacles d'Outre-Mer. Par Jules Leclercq. A. Lemerre, Paris, 1906.

Mr. Leclercq is a consistent traveller and an ardent lover of nature. What he sees he feels, and from the most favourable side. To him any point of view is handsome, any scenery pervaded with a poetic glow. Hence poetry, not prose, is the form in which he communicates his impressions. It is not poetic geography, and hardly may it be called geographic poetry.

There is a remote connection between the book and geography, however, in that each subject is chosen from some locality or site, or relates to some natural phenomenon. But this does not make the little volume fit for a review in a geographical bulletin. We must limit ourselves to thanking the author for his courtesy in transmitting the book to the Society, and to expressing the hope that it may be followed by others of like tenor and value. A. F. B.

The Glacial History of Nantucket and Cape Cod, with an argument for a fourth centre of glacial dispersion in North America.

By J. Howard Wilson. x and 90 pp., 38 plates and maps, and 13 figures. The Macmillan Company. 8vo, illustrated, cloth. (\$2.50 net.)

This book is a distinct addition to our knowledge of the glacial history of eastern North America. It is the result of studies for the Doctorate of Philosophy at Columbia University. The matter is treated in five chapters.

Chapter I gives a general discussion of the region and of previous work in it. Chapter II discusses the Wisconsin Ice Sheet, and the evidence for the existence of two lobes—the Nantucket and Long Island lobes. Two retreating stages are demonstrated in southern New England. The first is marked by the lower moraine of Long Island, Block Island, and the western end of Martha's Vineyard, for the Long Island lobe; and by the eastern end of Martha's Vineyard, Nantucket, and an unknown eastward extent for the Nantucket lobe. The inter-lobate moraine is formed by the hills on the eastern shore of Buzzard's Bay and northward in Plymouth. The second stage is marked by the northern moraine of Long Island, Fishers Island, and the Elizabeth Islands for the Long Island lobe; and by the backbone of Cape Cod for the Nantucket lobe.

Chapter III describes the preglacial and early glacial formations of Nantucket, and Chapter IV gives an account of the Sankaty Head beds of Nantucket. The author believes that considerable erosion has occurred since the region was studied by Desor and Cabot in 1849, so that the lower clays are no longer visible, their dip having carried them below the erosion level. A detailed section is given of the beds as exposed by excavations made by the author for the purpose. An analysis of the material of each bed was made to determine if possible its mode of origin. Sixteen beds are differentiated, and the Pleistocene fossils found in eight of them are listed, with their relative abundance indicated. Altogether 81 species are listed; 11 of these are from earlier lists and not found by the author. He adds to the former list 21 species which had not been found before. The author interprets the fossiliferous beds as having accumulated *in situ*, in an inlet or lagoon in Inter-glacial time.

Chapter V considers the deposits made by the Wisconsin Ice Sheet. The front of the ice is marked by the steep ice-contact slope of the apron plain, the same hills being formed under the ice or as a feature of retreat. Several well-defined channels can be traced across the island.

Chapter VI briefly discusses Martha's Vineyard and Block Island, and Chapter VII considers the moraine of upper Cape Cod, the Elizabeth Islands, and Fisher's Island.

Chapter VIII describes a glacial lake which occupied part of Cape Cod Bay, and in which the plains of Eastham, Wellfleet, and Truro were deposited as delta sand-plains, as outlined by Grabau in 1896. The lake is named in memory of the late Professor N. S. Shaler, "whose name is indissolubly linked with the history of geologic science in New England." Four stages of the lake are recognized. These were embayments in the front of the ice-sheet and their southern shoreline was the terminal moraine. Each of the successive stages was determined by the opening of successively lower outlets across the moraine, the outlets being readily correlated with the plains formed during these successive stages. The outlines of the successive lake stages are represented on a series of maps.

Chapter IX gives the argument for a fourth centre of glacial dispersion in North America. Many citations are given from the glacial literature of New

England and Canada, which show difficulties in accounting for the facts on the hypothesis of one centre of accumulation in Labrador.

The author concludes thus:

It would seem as if we had evidence enough to seriously consider the possibility of the former existence of an active ice-sheet on Newfoundland, and indeed, I can hardly see how we can escape the belief that during the last glacial period this Newfoundland area was occupied by an ice-sheet of such magnitude and such activity as to be able to send its lobes and glaciers to the edge of the continental shelf, and southwesterly even as far as Cape Cod and Nantucket.

F. P. G.

L'Influenza italiana nella Grandezza di Spagna—Alessandro Malaspina e la Relazione del suo Viaggio. Per Augusto Zeri.

This separate print from the "*Rivista Marittima*" deals with: First, a brief mention of the many Italians that distinguished themselves in the service of Spain, beginning with the war against the Mohammedans from 1116 to 1230, when Italian leaders commanded the Spanish navy. Second, the life of Alessandro Malaspina and his voyage, and the fate of his writings.

A chart of Malaspina's voyage (1789-1794) prefaces the title. The tone of the first section is moderately fair, Italian ability and prowess are naturally placed in the foreground, and it cannot be denied that, at sea, the Spanish navy held its own only as long as it was under the leadership of Italian commanders. But it is going too far to assert that the greatness of Spain was born and grew with Italian assistance and began to decline as soon as the Italians withdrew their co-operation. There were other and more potent causes instrumental in bringing about both the rise and the fall of Spanish power.

The voyage of Malaspina has attracted as yet but modest attention, for the reason that the original report, written mostly by Malaspina himself and consisting of sixteen volumes in folio, with numerous illustrations, was only discovered in 1868 and but part of it published (in 1885) by Pedro de Novo y Colson. This publication forms a volume of 700 pages folio and the editor asserts it is only a small portion of the whole.

The temporary loss of Malaspina's manuscript is due, as well established, to the apparently most unjust treatment of its author by the Spanish Government, after his return in 1795. It is known that Malaspina, two years afterwards, was imprisoned and kept in durance for five years, his papers and other documents being confiscated. In 1802, in consequence of threatening letters by the First Consul Bonaparte, he was released and allowed to return to Italy, where he died in 1809, at the age of 54 years.

The publication of de Novo y Colson embraces, as stated by himself, only one-seventh of the report of Malaspina. The whole consisted of five sections, and there remain to appear in print five and the charts and maps. Signor Zeri devotes the close of his interesting pamphlet to an appeal to his country, urging Italy to take in hand the publication of the whole. It would not only be an act of justice to the memory of a distinguished and much-injured man, but a highly valuable contribution to knowledge. Now that the United States hold the territory which Malaspina explored on the northwestern coast (he reached latitude 60° 20' in Alaska), it may be asked if we also have not a direct interest in the publication of the remainder of his writings?

From the farthest point north, reached on our Pacific coast, Malaspina sailed southward to Acapulco, hugging the coast rather closely and exploring it to a certain extent. The report on his visit to the Philippines might also be of interest to the public of the United States under present circumstances. A. F. B.

Philadelphia: The Place and The People. By Agnes Repplier.

The Macmillan Co. xxi+392 pages and 81 illustrations.

In her preface Miss Repplier recalls a dry little history of her school days, of which one page only remains distinct in her memory—that containing West's picture of Penn's Great Treaty with the Indians at Shackamaxon. In this the Penn of thirty-eight years is represented as a portly, middle-aged gentleman, delivering a speech, twenty years before its real date, to a crowd of peaceful Indian families who are investigating with mild interest the various gifts strewn around; "the whole composition suggesting an entertainment midway between a church fair and an afternoon tea!"

Painted in the days when the carping voice of the art critic was not heard in the land, this picture hardly represents accurately the actual event; but its peaceful—nay, almost stolid—atmosphere well typifies the history of Philadelphia during its first seventy years of life.

Penn's religion and his colonial policy, while giving to the Quaker colony a long youth of most unheard-of peace and prosperity, robbed it of most of the picturesque qualities which go towards making interesting history. That the author has succeeded in giving a pleasantly readable account of those seventy Fat Years is due mainly to the gentle charm of her style and to her graceful humour. Her picture of William Penn—the White Truth Teller, as the Indians called him—from the days of his childish visions of "ghostly manifestations," through his militant young manhood, to his sad and poverty-stricken old age, has all the sympathy and vividness of West's brush with, in addition, the accuracy of a conscientious historian.

Of course, in studying colonial Philadelphia "we can no more escape from Benjamin Franklin than we can escape from Michelangelo in studying the treasures of Rome and Florence" and his name greets us from many a page. Though there is want of variety in his continual appearance as founder, director, or commissioner—in every event Philadelphian—it is the only monotony that he allowed himself in his eventful life, and our hearts warm anew to his genial, practical humanity. The glimpses of his domestic life and character are very welcome to the curious mind; and though to the flippant of to-day he may lack lightness of touch, still, when he writes to his wife, "I forgot to mention a fine jug for beer. I fell in love with it at first sight, for I thought it looked like a fat, jolly dame, clean and tidy, with a neat blue and white calico gown on, good-natured and lovely, and put me in mind of—somebody," we have no doubt that the compliment was pleasant to her loving heart.

The chapter on "How the Quaker City spent its money" is truly characteristic of the town. Mrs. Isaac Morris might be painted by Kneller in a "blue gown relieved by crimson;" the pretty young ladies might flirt, primly, at the "Dancing Assemblies" lately started; but there was a lack of abandon in these diversions which did not characterize the suppers and dinners of a later day with their bountiful provision of rum punch, and ale enough to warm the most unemotional natures. It is nothing to the discredit of these good Philadelphians that Miss Deborah Morris probably took as much pleasure in presenting a skeleton to the Philadelphia Hospital, and the Colonial Assembly in building the pretty Quaker Almshouses, as did the rich and gay in their social delights. It required the charming and gifted Major André and his friend De Lancey, at winter quarters with the British army in the city, to bring to Philadelphia the riot of gaiety which ended in the gorgeous Mischianza given as a parting fête to General Howe.

Those were wonderful days for the youth and fashion of the town, as is most interestingly told in this book.

The account of the time of the Continental Congress and of Philadelphia as the seat of the new republican government is relieved from the tedium of mere history by many biographical details. The heart warms to fighting Samuel Wetherell, leader of the Free Quakers, who was disowned by the Friends because he preached forcible resistance to the English. One pities sedate Elizabeth Drinker as she sees her house dismantled of old furniture and plate for the taxes which her husband will not pay to support the war.

And one listens with curiosity as Chief Justice McKean solemnly argues for the title of Serene Highness for the President of the Republic, as opposed to that of High Mightiness rather favoured by Washington himself.

With this book in hand it is not difficult to see and to love colonial Philadelphia. Under the guidance of Miss Repplier one may thread his way through crooked streets to the Old Swede Church standing in the middle of its quiet graveyard; or may look through the iron railings of Christ Church upon the ample stone which covers the remains of Benjamin and Deborah Franklin; or find his way to Carpenter Hill, in Jones Alley; or to the Betsy Ross House; or visit the quaint stone house of the botanist Bartram, surrounded by strange trees of his own planting; or drive to Belmont Mansion, once the scene of Judge Peters's convivial hospitality.

Any one who would know the heart and body of this placid, unemotional, dignified Quaker City may read this book, assured that he will profit by Miss Repplier's golden gifts of truth, charm and interest.

H. P. L.

Home Life in France. By Miss Betham-Edwards. With illustrations from photographs and famous paintings. Chicago, A. C. McClurg & Co., 1906. Second American Printing.

To peruse a work wherein every sentence almost bears the stamp of fairness and utmost good will towards a people is always a great pleasure. The authoress of the volume before us is animated by the kindest feelings towards the people of France, anxious to do them justice, oblivious completely of the deep national prejudices so characteristic of the English. She may not be always right in what she states, but if she errs and when she errs, it is rather through too strong a leaning to the French side of a question. Her book is very well written, appropriately illustrated, and full of interesting detail on questions related to her subject. But that subject is not directly geographical; it is rather ethnographic and sociologic, and a geographic Bulletin is not really the place for an exhaustive review. We may sincerely commend it to the general reader and to the student of sociology, but to discuss it would be going too far out of our way. To English and American readers who wish to acquire an independent opinion of the French people it is a valuable guide, if not a sure one on every point. The tribute paid to French intellect and genius is often touching, but the anxiety to be just and fair leads the author sometimes to overcredit.

It is a book that should do a great deal of good. Without aggressiveness, it is directed, perhaps not intentionally, against the barriers of traditional misunderstandings and historical aversion of nationalities. More of the kind would be "in order," and there is room yet for a great many more. Miss Edwards is not at all fond of American girls, for instance, or of American women in general; it might not be amiss if her example were followed by an explanation to the English, of American female character in a proper way.

A. F. B.